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THE COVER: Shiny black eyes, a pointed snout ending in a button nose, toes more nimble than human fingers, rich fur and high intelligence characterize the "Masked Bandit of the Night," the raccoon. The front cover painting was done by Takehiro Taira, a Kalispell artist and frequent contributor to *Montana Outdoors*. To learn more about this animal the Sioux called "wica" (little man), turn to Frank Gjersing's article on page 11. The black-necked stilt (back cover photo: Harry Engels) is one of 12 species of shorebirds which breed in Montana. As Dave Books' text points out and our shorebird photo feature illustrates, these gentle, graceful birds are an integral part of Montana's prairies and lowlands. "Shorebirds of Montana" begins on page 17.

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The Editor's Column

I've come to the conclusion over the years that knowing too much about some things can spoil half the fun. Being a starry-eyed novice has its advantages, not the least of which is whatever you're doing tends to be more exciting when you're just learning. I know one veteran elk hunter who routinely collected his elk year after year with a rifle. Things started to get a little old hat, so one year he bought a bow and tried his luck at the early bugling season. The change had the desired effect: He bugled a big bull to within about 30 yards. But then, so he tells me, his knees turned to jelly and his heart tried to jump out of his chest. After missing the shot, he had to sit down and rest for 15 minutes until he could quit shaking.

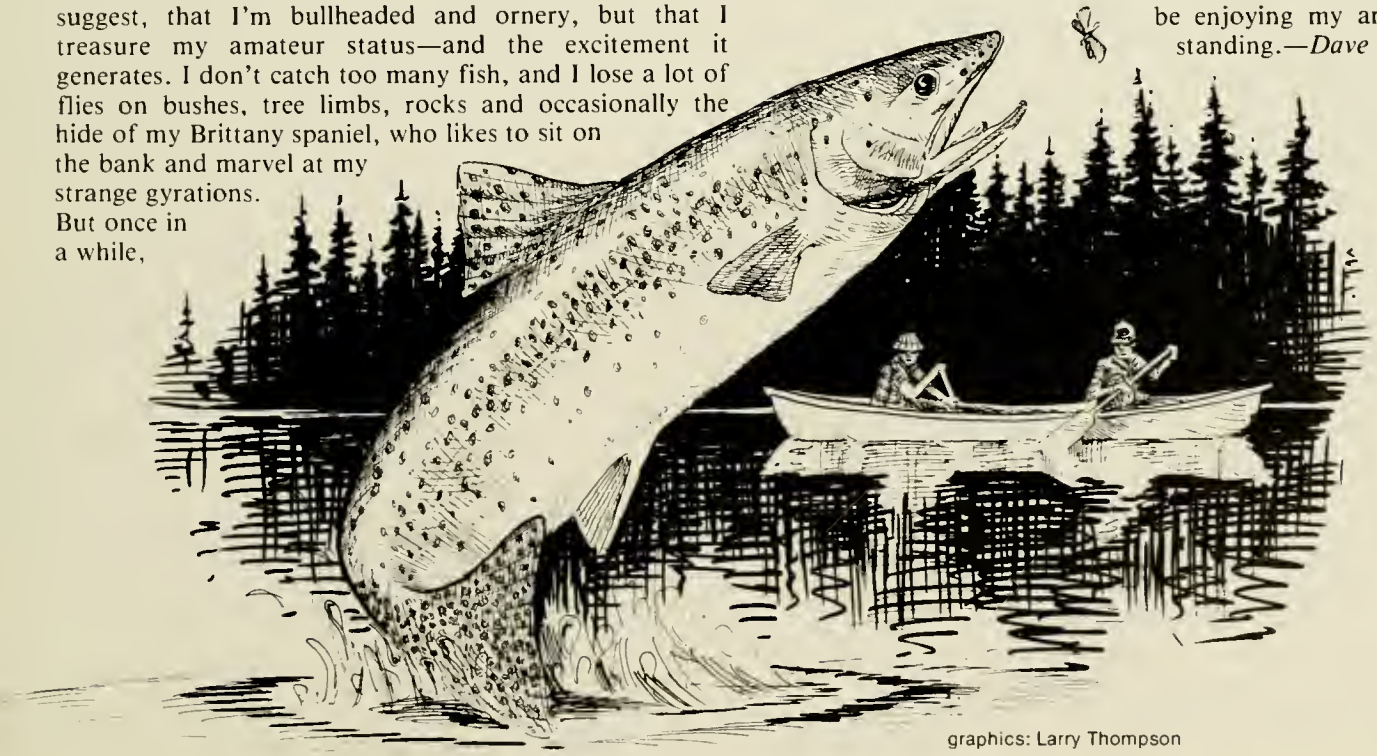
At one time, rooster pheasants were that way for me. A gaudy ringneck boiling up under my feet would give me such a shot of adrenalin that I would be lucky to even find the safety catch, let alone hit the bird. Experience plus a lot of wing shooting practice finally cured that problem, but in a way, I sort of miss the old days.

Fortunately, there's always a new frontier, and a few years ago I discovered another way to sabotage my nervous system: It's called fly-fishing. When I announced I was taking up the sport, my well-meaning friends offered to teach me the finer points of fly-casting, guide me through the maze of fly-fishing knots, acquaint me with the relative merits of various rods, reels, lines and leaders and instruct me in the art of fly-tying. Wisely, I refused all offers. The reason is not, as my friends suggest, that I'm bullheaded and ornery, but that I treasure my amateur status—and the excitement it generates. I don't catch too many fish, and I lose a lot of flies on bushes, tree limbs, rocks and occasionally the hide of my Brittany spaniel, who likes to sit on the bank and marvel at my strange gyrations. But once in a while, through the right combination of compensating errors, I hook a trout; sometimes, I even manage to land it. When I do, my knees shake, my hands tremble and I am incapable of doing anything except holding on to a rock to keep from falling in the river.

I know from reading outdoor magazines that there are people who catch 20-inch trout every time they go fly-fishing. These steely-nerved characters catch a lunker, unhook it, tie a tiny new fly on their leader (usually something like a size 20 black gnat), relight their pipes (in a strong wind) and calmly resume fishing. All this without even a mild palpitation of the heart or a modest tremor of the fingertips. If *that's* all I have to look forward to, I'd just as soon remain a novice.

It's far from a foregone conclusion, but I suppose if I keep at it long enough, I too may someday become adept at fly-fishing. I imagine myself—gray-bearded, draped in paraphernalia and steeped in trout lore—wading the trout streams in solemn dignity, calmly collecting a 20-inch trout on every third cast. But reaching that exalted state will take me at least another 30 or 40 years, and by that time my heart won't be able to stand much excitement anyway.

In the meantime, if you're out fishing and run across someone with a fly line hopelessly tangled in the brush, or nearly in a state of shock from catching a 12-inch trout, or consoling a Brittany spaniel with a Royal Wulff in its ear, it'll probably be me. Try not to offer any advice, no matter how badly it appears to be needed. I'll simply be enjoying my amateur standing.—*Dave Books*



graphics: Larry Thompson

Natural Wonders, Historical Treasures

Come with us on a brief tour of eastern Montana's parks and monuments—places where history, nature's creativity, man's curiosity and the prairie country's vastness come together.

by Dan Vincent

EASTERN MONTANA—a special kind of country to those who really understand the subtle values of wide-open spaces. Those who truly know the prairie country recognize that it's the kind of place that can make a person feel small, which is the way he should feel when surrounded by that kind of vastness.

The eastern part of the state does have its share of flat country. Perhaps that's why it's sometimes called a desolate no man's land or the "big ugly." In some stretches, it's so flat that the sun rising on an isolated foot-tall sagebrush plant casts a shadow that seems a mile long.

It's a dry and thirsty land, and water made it what it is. Water formed its rocks in the beds of ancient Cretaceous seas. Water sculptured its rocks, gnawed mazes of steep-walled coulees and alluvial valleys, carved its buttes and stripped away its flesh, leaving a sea of jumbled geologic skeletons.

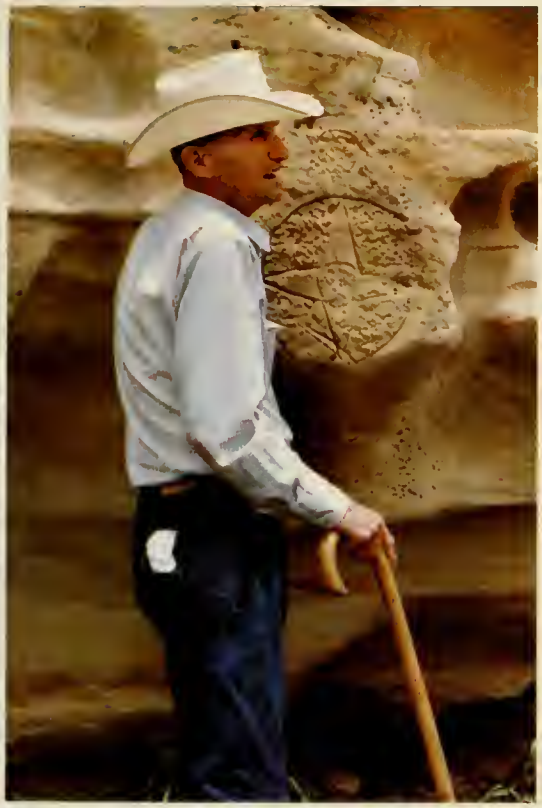
But its geologic diversity and paleontological oddities can best be appreciated by visiting some of its state parks. They offer the chance to see, with quiet clarity, the size and meaning of this world. The prairie country also offers a wide selection of historic landmarks. A visit to an historic site reinforces what has been earlier learned about the past. Studying the battle terrain as a soldier must have done or standing on a river's bank where a paddle wheel steamer once tied up can help recapture the past with a realism no history book can match.

A glimpse of history may even help one understand the present, because life today has been irrevocably shaped by events of the past. So come with us on a brief tour of eastern Montana's parks and monuments—places where history, nature's creativity, man's curiosity and the prairie country's vastness come together.

MAKOSHIKA STATE PARK

The name "Ma-ko-shi-ka," which supposedly means "bad earth" or "bad land" in the Sioux dialect, typifies the rugged topography and remoteness of this land. Surrounded by a seemingly endless vista of broken hills, gullies, hidden chasms and formations weathered into eerie shapes, it's sometimes easy for park visitors to forget that Glendive lies just down the road a few twisting miles.

The clays, silts and sands of this ancient fossilized river bed were deposited millions of years ago when streams carried their loads eastward from the newly forming Rocky Mountains. Compaction and time's passage have transformed the sediments into sandstone and sedimentary shale formations which geologists call the Hell Creek Formation. The thin black bands sandwiched between the layers of stone are a key to Makoshika's past. The coal seams are reminders of a much warmer tropical era when dense forests and other vegetation filled large swamps. These lagoons were eventually covered and buried by sediment and over the eons, coal



In addition to its rugged beauty, Makoshika State Park (far left) houses many fossilized remains of dinosaurs which once roamed the grasslands of eastern Montana (photo: Mike Sample). At left is Elmer "Slim" Kobold, former owner of the Rosebud Battlefield State Monument site, looking over some pictographs found there. Mr. Kobold's enthusiasm to see his ranch become an historical monument eventually led to the state purchasing the site with funds generated by state coal taxes (photo courtesy of the Bureau of Land Management). The impressive rock formations at Medicine Rocks State Park (below) were formed in part by sand deposited by an easterly flowing river and later compacted into stone (photo: Kristi DuBois).

was formed.

During this warmer era, dinosaurs roamed the grasslands and brackish swamps of eastern Montana. Many fossilized remains of these now-extinct giant reptiles have been found in the Makoshika Badlands. Frontier Gateway Museum and Dawson Community College in Glendive offer fossil displays.

Picnic and camp facilities (including tables, grills, sanitary facilities and drinking water) are available near the entrance to Makoshika.

MEDICINE ROCKS STATE PARK

As the name implies, this site was one of "Big Medicine," where Indian hunting parties conjured up magical spirits that bolstered courage, increased strength and brought good luck to the hunters. The park area was undoubtedly popular with early nomads judging by the large number of artifacts found.

As at Makoshika, the sandy strata were laid down by a broad, shallow, easterly flowing river and then compacted into stone. Some chunks of sand were compacted and cemented more solidly than others, so they were harder and more resistant to weathering. These huge, pock-marked hunks of stone became the "Medicine Rocks" which jut abruptly from the rolling prairie near Ekalaka.

Early Indians were not the only ones to appreciate what Medicine Rocks has to offer. While seeking shelter from a cold, wet, three-day rainstorm during a hunting trip on the prairie, Theodore Roosevelt once said of the rocks: "The sun was just setting when we crossed the final ridge and came in sight of as singular a bit of country as I have ever seen. Over an irregular tract of gently rolling sandy hills, perhaps about three-quarters of a mile square, were scattered several hundred detached and isolated buttes or cliffs of sandstone. . . .

"Some of them rose as sharp peaks or ridges, or as connected chains, but much the greater number had flat tops like little table-lands. The sides were perfectly perpendicular, and were cut and channelled by the weather into the most extraordinary forms; caves, columns, battlements, spires and flying buttresses were mingled in the strangest confusion. On the tops and at the bases of most of the cliffs grew pine trees, some of considerable height, and the sand gave everything a clean, white look. Altogether it was as fantastically beautiful a place as I have ever seen."

Although it lacks the dinosaur fossils present at Makoshika, Medicine Rocks offers camping and picnic sites and "the best durned drinking water in the country!" No visit to the area would be complete without a stop at the Carter County Museum in Ekalaka.

PURGATORY HILL STATE MONUMENT

Purgatory Hill—a high, sagebrush-fringed, flat-topped butte overlooking Rock Creek Recreation Area and Fort Peck Reservoir—is the newest state monument and the site of a significant paleontological discovery. The discovery is inextricably linked to the naming of the area.

During past eons, shrew-like mammals of the species scientists call *Purgatorius* scurried through the forests and along the stream banks. Those fortunate enough to elude their natural enemies or the feet of lumbering prehistoric beasts died of natural causes. Their bones were washed into streams and deposited below riffles in slow-moving eddies, or buried along with clam shells in silty sediments.

Laboring in the hot summer sun some 70 million years later, Robert Sloan of the University of Minnesota and Leigh Van Valen of the American Museum of Natural History excavated tiny fossilized teeth and bones from *Purgatorius*. Scientists believe the small, bewhiskered animals represent the primitive stock from which primates (an order of mammals comprising man, apes and monkeys) emerged.

Dr. Sloan and his associates are continuing their quest to reconstruct man's ancestry from the furry little *Purgatorius*. Each May since 1962, students from the University of Minnesota have made the trek with Sloan to Purgatory Hill. The procedure used by the research class to extract fossils is fascinating to watch. The butte's rocky soil is stripped away with pickax and shovel, loaded in gunny sacks and lugged down a precipitous trail to a waiting van. One can readily see another reason why "purgatory" was an apt name for the site.

At Rock Creek Recreation Area, students run the soil through wire mesh screens to sift out broken fragments of clam shells which contain the fossilized remains of *Purgatorius*. At the university laboratory, the shells are chemically treated and students picking through the final remains are lucky to find one or two skeletal remains, the product of hundreds of hours of labor.

In February the Department of Fish, Wildlife and Parks leased land surrounding Purgatory Hill from the Department of State Lands. Future plans call for road and parking lot development, visitor trails and informational signs.

ROSEBUD BATTLEFIELD STATE MONUMENT

The department's park system in eastern Montana was greatly enhanced with recent acquisition of Rosebud Battlefield State Monument, the Powder River Depot State Monument and the Far West Fishing Access.

The battle fought at the headwaters of Rosebud Creek (near present-day Decker) served as an important link in the chain of events leading to annihilation of Lt. Col. George Armstrong Custer's Fifth Detachment of the 7th Cavalry at the Battle of the Little Bighorn. Here, on the south fork of Rosebud Creek, one of the largest engagements in the history of the Indian wars took place. Gen. George Crook's column included some 1,100 soldiers, civilian prospectors and packers and over 200 Crow and Shoshone scouts. The opposition—Crazy Horse's Sioux and the Cheyenne—numbered at least that many, and perhaps more.

Crook, along with Custer and generals Terry and Gibbon, were instructed to form a wedge, Crook advancing north from Fort Fetterman, Wyo.; Terry and Custer

west from Fort Abraham Lincoln, Dakota Territory, and Gibbon east from Fort Ellis, Mont. Their objective was to surround and crush the Indian forces in a classic military movement.

With perfect timing and execution, this plan might have succeeded. However, the rough terrain and a poor communications system made synchronization nearly impossible. Unfortunately for Crook and his command, the Army also underestimated the number of Indian warriors.

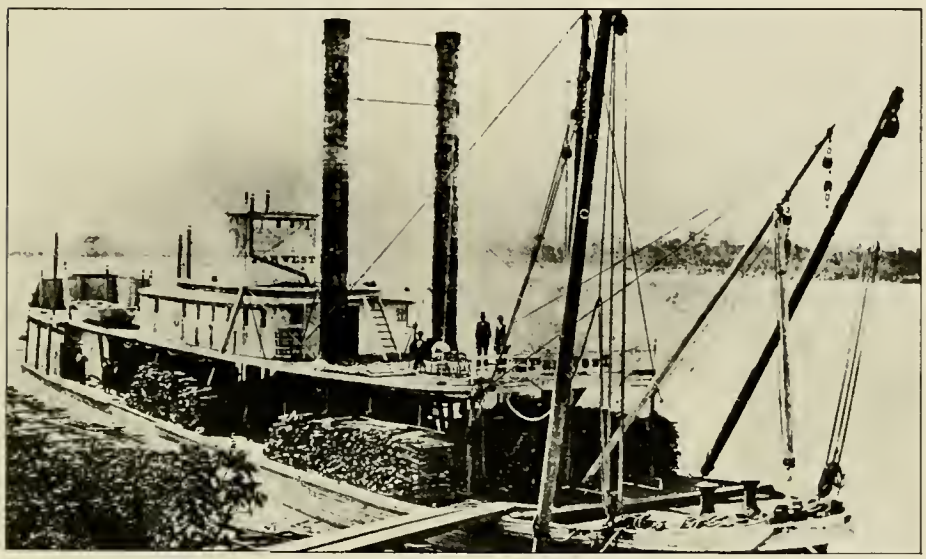
While Crook's men rested on the banks of the Rosebud on the morning of June 17, 1876, nearly 1,500 Sioux and Cheyenne led by Crazy Horse unleashed their assault. The ensuing clash was dramatic and lasted most of the day. When the smoke cleared, nine of Crook's men were dead and 13 seriously wounded. Indian losses are not known precisely, but probably amounted to at least 50. Crook claimed victory because his command controlled the battleground and the Indians retreated. However, it was only a tactical victory since Crazy Horse had stopped Crook's advance. Also, the failure of Crook's column to remain in the field after this battle doomed the rest of the command and the 225 men under Custer. With supplies and ammunition nearly exhausted, Crook retreated south to Goose Creek for a lengthy rest period. Undoubtedly, the Indians' display of courage and valor during the battle helped bolster their spirits and enthusiasm for the days ahead.

Had Crook's troops penetrated farther north into the heart of Sioux country, the incident at the Little Bighorn eight days later might have been avoided.

The significance of the monument site lies not only with its history as a battlefield, but also because of its prehistoric buffalo jump, early cattle ranching history and recent energy development. The history and prehistory of the northern Great Plains are nowhere as dramatically and forcefully displayed as here, at the Rosebud Battlefield State Monument.

The battlefield site was purchased by the department in January with funds generated by the state coal tax. Future development will include road improvements and informational signs. The farmed land within park boundaries will be seeded back to native vegetation; with time, the rolling hills and valleys will again look as they did when Crook's and Crazy Horse's forces clashed over 100 years ago.

Long-range plans may include a visitor center and museum with guided tours.



Dubbed the "Speed Queen" of the Missouri, the Far West (above) steamed from the Bighorn to Bismarck in 54 hours (photo courtesy of the State Historical Society of Missouri). Early settlers enjoy the wonders of Medicine Rocks, situated near present-day Ekalaka (photo: Septon Cady, 1903, courtesy of the Carter County Museum).

FAR WEST FISHING ACCESS

During the Indian campaigns of the 1870s, the two best known steamships on the upper Missouri and her tributaries were the Josephine and the Far West. They proved to be both an economical and a speedy mode of shuttling supplies and troops to the various military cantonments on the lower Yellowstone River.

During the campaign of 1876, an Army supply depot was established on the banks of the Yellowstone at the mouth of Rosebud Creek. It was here—in a cabin on the steamer Far West—that generals Terry and Gibbon and Lt. Col. Custer formulated their battle strategy. At noon on June 22, Custer and his famed 7th Cavalry followed the path of Rosebud Creek toward the Little

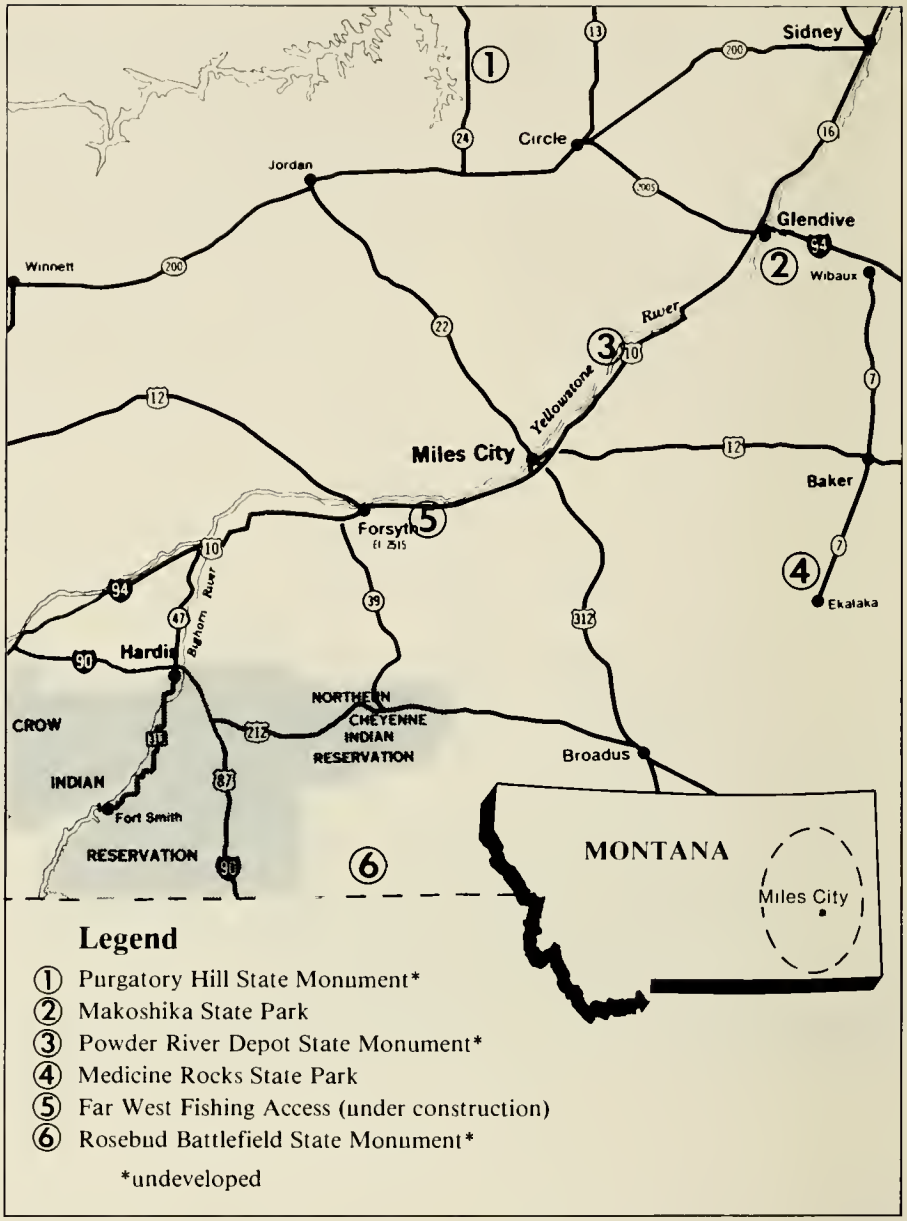
Bighorn River.

On June 23, the Far West, captained by Grant Marsh, moved upstream from Rosebud Creek to the mouth of the Bighorn. With great dexterity, Marsh then coaxed the mighty steamer up the treacherous tributary to its junction with the Little Bighorn. Here, Marsh waited for news of the battle.

One week later, as the story of the Custer battle was still unfolding, Marsh prepared to thread the Far West down the Bighorn's narrow channel to the Yellowstone. On July 3, the Far West, carrying reports of the Custer battle and 38 seriously wounded soldiers, sped eastward to Fort Lincoln (present site of Bismarck, N.D.), a distance of 710 miles, in a mere 54 hours. Unknown to Marsh, the Far West had set a downstream speed record unequaled by any other craft to float the Missouri or her tributaries from Fort Benton to St. Louis. The Far West was dubbed the "Speed Queen" of the Missouri.

The Far West Fishing Access is scheduled for development during late summer. Leased from the Department of State Lands, the 30-acre area will offer picnic and camping facilities and boating access to the Yellowstone River. A small, gravel-bottomed pond has been stocked with smallmouth bass.

Access to Far West is via the I-90 exit at Rosebud.



POWDER RIVER DEPOT STATE MONUMENT

During her epic flight down the Yellowstone and Missouri, the Far West paused below the mouth of the Powder River long enough to bury Pvt. William George, who was wounded with Maj. Reno's troops. Today, George's grave site has been restored and a marker bearing his name identifies its location.

Like the Rosebud, the mouth of the Powder River was a significant landmark and camping spot for early travelers. Prehistoric remains such as arrowheads, scrapers and other tools have been found scattered about the area. Archaeological evidence suggests that more than one Indian civilization occupied its banks. During more recent times, Sitting Bull's Sioux camped near here during the winter of 1869.

During one point in the Indian campaign of 1876, the Powder River area buzzed with activity since it was a major supply depot along the Yellowstone. Custer's troops departed from here on their westward trek, leaving all "nonessentials" behind in storage. Following the Custer battle, all remaining supplies were ordered shipped to Rosebud Creek. Because more than one trip was necessary, many of the supplies were left behind. When the steamer Far West returned for the remainder, a skirmish developed when Army troops found Sioux rummaging through the supplies. One Army scout was shot in the fracas and buried overlooking the Yellowstone.

During August of that same year, Crook's troops camped at the Powder River site for nearly two weeks awaiting orders. Among the 4,000 troops and scouts in the encampment was William F. "Buffalo Bill" Cody, Crook's chief scout.

The department is leasing this historic monument from Burlington Northern Inc., in cooperation with the Bureau of Land Management and a private landowner. Future plans include road improvements, historical signs, picnic facilities and a boat ramp. No facility improvements presently exist. ■

When is a Coyote Worth $275?

When it's the best of more than 850 coyotes taken from and around Phillips County, Montana. When the coyote has an unusually soft fur, good color contrast on the back and silky pale fur on its belly. When the hide is well-skinned, well-stretched and well-cleaned. When the coyote is sold Jan. 26, 1979 at Malta's first annual "Montana Fur Sale," a venture promoted with initiative and energy by three local businessmen in their '20s. When the other coyotes at the sale went for a record average price of $184 apiece. When one bobcat sells for $450, red foxes and badgers average $100 and two cross foxes (red foxes with black markings) go for $225 each. And when out-of-state fur buyers are trying hard to impress and attract Montana fur takers and compete with local markets.

The $275 paid by Hannibal Fur of Minnesota is a high price, but not a record. The Edmonton Fur Auction listed a high price of $336 for the best of 33,131 coyotes offered at its February sale. The Dominion/Soudack Fur Auction in Winnipeg reported a price of $335 for the top coyote. (Both reports quoted the prices in U.S. dollars.)

According to an October 1978 issue of *Forbes*, a respected business publication, retail fur sales in the United States totaled approximately $1 billion in 1978. This represents an increase of almost $400 million over 1977, and rivals the record $520 million sale in 1943. (The 1943 record still stands, however, because the dollar was worth more than twice as much then.)

Fur sales have increased dramatically in the 1970s—the 1971 sale was only $279 million—partly due to inflation but also because of increasing fur exports. At least one-third of the furs sold are going outside the United States. Japanese fur imports from this country went from nearly zero in 1972 to more than $4.4 million in 1977 and are close to double that now. The deflated dollar and the stronger yen, mark and franc have contributed to this burgeoning export market.

The fur industry has undergone a transformation in the last five years. American Fur Industry, the promotion arm of the fur business, has changed the trade's image. The industry argues that it is no longer dealing in endangered species or searching for unique or exotic furs. Instead, industry spokesmen point out they are working with species that are plentiful and, in some cases, problems—such as coyotes, foxes, raccoons, badgers, nutrias, beavers and rabbits.

Design is now more important than fur species. More interest centers on texture and color. New techniques such as feathering, ribbing or adding strips of leather to soften the appearance and lighten the weight are used. The traditional concern about a fur's lasting qualities is not as important today. Now, quality comprises the sum of skin, workmanship and design. The trend seems to emphasize production of a rugged, rustic, natural, western look in parka and jacket styles.

Advertisers are appealing to a new market: younger women with their own incomes and also to men. In the October 1978 issue of *Vogue*, 57 ads for fur coats appeared. Dressing athletes like Walt Frazier, Joe Namath, Tom Seaver and Willis Reed in fur has helped to encourage a "masculine" market that now accounts for 10% of retail sales. That figure is expected to exceed 25% in the next five years. To strengthen this promotional effort, the city of New York hosted the First International Fur Fair in March. With an eye to the future, New York, the fur trade union and the American Fur Industry—with the help of a federal grant—are recruiting and apprenticing young fur designers and craftsmen.

However, price has been the most dramatic new development. Raccoon coats that sold for $800-$900 10 years ago garner about $3,500 today. For 25 years, good quality, classic-cut mink coats brought $4,000-$5,000. Today, you can flip through last fall's issues of *Vogue, Mademoiselle, McCall's* and other fashion magazines and see coats of natural badger at $9,750, red fox at $11,950, coyote at $6,500 and red fox—dyed violet—for $16,000. Compare these prices with fur reports listed in the department's Biennial Reports to the governor for the 1950s (see chart). The figures are based on surveys which determined trapper success and average

Part of the fur display at the "Montana Fur Sale," conducted Jan. 26, 1979 at Malta (DFWP photo: Mike Aderhold).

recycled paper

pelt prices received by fur dealers. The total figures could be a little off, but the average prices are probably close.

Fur harvesting in Montana generates a great deal of interest. For example, the sale in Malta grossed over $170,000. Some aerial coyote gunners are pocketing $30,000 checks. The Montana Trappers Association has over 400 members representing almost every county in the state. Fur rendezvous conducted in Lewistown last September and again this May attracted over 125 trappers from a number of states. Trapping techniques were featured at a Boy Scout Camporee outside of Circle last October. At public forums sponsored by the department in Plentywood and Scobey, the taking of fur was a dominant issue. State Sen. Ed Smith (R-Dagmar), a former gubernatorial candidate, personally introduced fur harvesting legislation in the 1979 Montana Legislature. Coyotes, red foxes, bobcats, lynx, wolverines, swift foxes and trapping seasons and techniques have all generated discussion at high political levels.

	COYOTE			BADGER			RED FOX		
Year	No.	Value	Avg. price/ pelt	No.	Value	Avg. price/ pelt	No.	Value	Avg. price/ pelt
1950-51	147	$190	$1.29	40	$35	$0.88	21	$45	$2.14
1952-53	196	437	2.23	154	106	0.69	6	8	1.33
1953-54	104	90	0.87	148	99	0.67	21	63	3.00
1955-56	118	122	1.03	264	201	0.76	87	87	1.00
1956-57	100	100	1.00	183	119	0.65	136	301	2.21

The Montana Department of Fish, Wildlife and Parks has received mixed signals on a variety of related issues such as aerial gunning, snowmobile hunting, use of snares, nonresident trapping and the taking of animals so far unclassified in Montana (foxes, badgers, raccoons, rabbits). The department is studying wolverines, bobcats and coyotes in various parts of the state. A full-time biologist monitors the state's fur situation and the department is planning to reintroduce fishers into a portion of their former range in western Montana.

During this time of shifting wildlife concerns, some interesting facts are surfacing. Among the most amazing is surely the fact of the coyote's resiliency. Half a dozen years ago, when the Livestock and Fish, Wildlife and Parks departments were asked to exert some control over coyotes, the amount of effort required wasn't appreciated. The entire department budget could have been expended on this project and it still would not have placed half the pressure free enterprise is exerting on the coyote today. Even with all this pressure, there is, at this writing, no evidence that coyote numbers are being severely affected in any part of the state.

Still, some information suggests fox and bobcat populations are down in some areas because of harvesting, and biologists know that beavers, fishers and martens were almost exterminated at one time in our state. So, the current situation requires continuing, close examination.—*Mike Aderhold, Region 6 (Glasgow) information officer*

Threat to Montana's Hunting

Since spring 1978, the Montana Department of Fish, Wildlife and Parks has been actively involved in a law suit in federal court which challenges use of hunters' dollars for wildlife management. The suit was brought by two animal preservation groups based in eastern states. It argues that money allocated to state fish and game agencies has been used to manage wildlife in a manner which "aggrieves" members of the groups and "myriads of nongame wildlife." The groups further charge that the money was allocated in violation of the National Environmental Protection Act.

The money in question is paid by shooters and hunters via an 11% excise tax on sporting firearms and ammunition. This tax system was developed by hunters through the Pittman-Robertson Act of 1937 (P-R). No general tax dollars are involved.

A similar excise tax system (10% on fishing gear) was developed by fishermen via the Dingell-Johnson Act of 1950 (D-J). The threat of a similar suit by these two preservationist groups regarding use of D-J funds also appears imminent.

In the next issue of *Montana Outdoors*, articles will explain P-R and D-J funds, the benefits derived by Montanans from the funds and the current court action. They should be of vital concern to every shooter, hunter and fisherman in Montana.—*John Weigand, chief, Wildlife Research Bureau; Norm Peterson, habitat preservation coordinator, Fisheries Division*

Janson Wins Annual Wildlife Society Award

Reuel Janson, formerly the Region 2 (Missoula) wildlife manager for the Department of Fish, Wildlife and Parks, received the Montana Chapter of The Wildlife Society's annual distinguished service award. The award was presented by Joe Egan, assistant administrator of the department's Wildlife Division, for Janson's "cumulative past, current and/or continuing achievements in wildlife conservation."

Janson retired this spring after more than 23 years with the department, 18 of which were spent in Missoula as wildlife manager. Among other activities, his career spanned the major restoration of Rocky Mountain bighorn sheep populations, creation of additional winter ranges for wildlife and a cooperative, interagency elk/logging study that has resulted in some guidelines on how to log without destroying key elk ranges.

Reuel Janson

The award—one of the highest professional honors in the wildlife field—was presented in Missoula at a joint meeting of four resource management groups.

Whooping Cranes Sighted

The first four of Montana's five endangered species—wolf, black-footed

ferret, peregrine falcon, whooping crane and bald eagle—are so rare that any sighting of them is newsworthy. On April 19, 1979, six adult whooping cranes were observed by at least a dozen people, including the whole staff of the Medicine Lake National Wildlife Refuge, 1½ miles southeast of Froid (about 13 miles north of the Missouri River and about 20 miles west of the North Dakota border).

The tall (4½ feet), white birds with long necks, huge black-tipped wings and red foreheads were warily feeding in grain stubble. They were observed from a little before noon until almost 5:30 p.m. The next morning they were gone.

One of the birds had a red band on its left leg and a cream-colored band on its right leg indicating it was part of the group that twice annually migrates between the Gulf Coast of Texas and northwestern Canada.

According to a recent Fish and Wildlife Service news release, at the time of the sighting only 109 whooping cranes were known to exist, 83 in the wild and 26 in captivity. This number is up from a low total of 21 in 1941.

Most of the free-flying whooping cranes summer on the 47,261-acre Aransas National Wildlife Refuge along the Gulf of Mexico near Corpus Christi, Tex. The birds nest and summer in the vicinity of the Sass River in Canada's huge (11,072,000-acre) Wood Buffalo National Park in the Northwest Territories. A second wild population has recently been started in southeastern Idaho by placing whooping crane eggs in the nests of sandhill cranes.

According to records maintained by Fran Larson, secretary at the Medicine Lake refuge, whooping cranes have been documented 22 times in 14 of the last 21 years in northeastern Montana. Before this year's sighting, the last time the big cranes were observed was from Oct. 29-Nov. 6, 1975. Four cranes were observed the first day and three remained for nine days on or near the Homestead Unit of the Medicine Lake refuge (see "Whooping Cranes Visit Montana" in the Jan./Feb. 1976 *Montana Outdoors*, "The Catchall" section).

In his book, "Cranes of the World," Lawrence Walkinshaw writes that the average departure date from Texas is usually April 15-22, but sometimes is as early as March 24 and as late as May 9. The 2,500-mile trip normally takes from eight to 14 days. The return trip in the fall usually occurs in late September.—*Mike Aderhold, Region 6 (Glasgow) information officer*

Update

Yellowstone Spill—State's Largest

Pipeline breaks are not Montana's only source of petroleum pollution (see "Oil and Wildlife Don't Mix" in the May/June 1979 *Montana Outdoors*). The state's most recent and largest single fuel spill was caused solely by human error.

On Wednesday evening, April 3, about 200,000 gallons of diesel fuel poured out of the Exxon refinery near Billings when someone accidentally left a valve open at the refinery's rail dock. The mistake was not discovered until about 5:30 a.m., Thursday. About 40,000 gallons of fuel reached the Yellowstone River, but the mistake was discovered in time to prevent the entire 200,000 gallons from escaping into the river via a ditch bisecting the refinery grounds. By Friday, April 6, the fuel had reached Hysham, 80 miles downstream. Officials expressed concern that wildlife and water supplies of towns downstream from the spill would be jeopardized.

Roger Fliger, supervisor for the Department of Fish, Wildlife and Parks Billings region, said he had met twice with Exxon and the Environmental Protection Agency officials, and all agreed that most of the cleanup had been completed by Friday, April 13. According to Fliger, the Fish and Wildlife Service will continue to monitor long-range effects of the spill on the river and Exxon will continue cleanup around the refinery.

Fliger said fish and wildlife were harmed by fuel from the spill. He acknowledged that the full extent of the damage "is not apparent at this time." But, he said he is "sure that the spill will have effects in the future, some of them long-lasting," such as impairment of the taste of fish.

To prevent similar spills in the future, the Department of Health and Environmental Sciences filed suit against Exxon on April 11 in Yellowstone County District Court. The suit demands $10,000 for every day from April 4 until the pollution is eliminated from the river. The suit also demands that Exxon submit to the state a compliance plan outlining its cleanup measures. The suit charges the spill "contaminated and altered the physical, chemical and biological properties" of the river.

As the earlier article pointed out, over 125,000 gallons of petroleum products entered state waters from 11 pipeline breaks in 1978. This single man-caused spill is 32% of last year's total spill.—*Judy Casanova, intern*, Montana Outdoors

A Wolf Was Killed In Valley County

The remains of an 83-pound, 5-foot 8½-inch, female, doglike animal found last Oct. 11, 24 miles north and a little west of Glasgow, have been verified as those of a wolf. Ed Bond, a Hinsdale stockman, brought the carcass to the Glasgow regional department office the day after he found it. The wolf was examined and the remains sent to the department's Wildlife Research Bureau Laboratory in Bozeman where lab supervisor Ken Greer cleaned the skeleton and made the fine measurements necessary to positively identify the animal. The department's nongame biologist, Dennis Flath, head of the Northern Rocky Mountain Wolf Recovery Team, also checked the remains and agreed with the identification.

Later, Jack Lynch, West Coast wolf authority who has worked with wolves almost daily for 18 years and who keeps 150 wolves at a facility called Loboland near Gardiner, Wash., checked the skull. Lynch estimated from the condition of the teeth that the animal was 3-4 years old. There was no sign of hybridization (a wolf/dog cross) and no evidence that the animal had ever been in captivity.

The skull was taken to Missoula where Dr. Philip Wright, mammalogist and professor emeritus in the Zoology Department at the University of Montana, remeasured the specimen and confirmed the identification. The specimen was also shown to Dr. Robert Ream, wildlife professor in the UM School of Forestry and director of the Montana Wolf Ecology Project. (This is a federally funded project to study the status of the wolf in western Montana.)

Ream carried the skull to Washington, D.C., and turned it over to Dr. Ron Nowak, wolf taxonomist and staff specialist with the Fish and Wildlife Service's (FWS) Office of Endangered Species. Nowak, who is familiar with the Smithsonian Institution's extensive wolf collection, said the skull is large for a female, especially in length. In fact, the skull is larger than those of most of the female wolves originally inhabiting the northwestern United States. The wolf's color and skull size seem to favor wolf races found in northern Canada. continued

It will never be known for certain where the Glasgow wolf came from. All authorities who have seen the specimen agree the animal is a gray wolf (*Canis lupus*) but some question exists about what race it might be. In 1944, Stanley Young and Edward Goldman, senior FWS biologists, revised the classification of gray wolves. They divided gray wolf populations in North America into 23 races; the differences in these races are subtle and involve minor dental and bone measurements, color and population location. It is difficult, if not impossible, to tell if a single skull is a large example of one race or a small example of another. Since wolf movements of over 400 miles have been documented, the Glasgow wolf could represent any one of four or five races.

The presence of a wolf in the Glasgow area is an extremely unusual wildlife occurrence. The find was probably a lone wolf from Canada which made an unusual sortie. It is the first positive evidence of a wolf in northeastern Montana since May 1956. This particular find is one of only seven wolves handled in Montana in the last 15 years. Wolves were found in the Sun River area in 1964, '68 and '74, near Eureka in 1972, on the Blackfeet Reservation in January 1977 and just this last April, one was radio tagged near the North Fork of the Flathead River west of Glacier National Park.

Because of the Jan./Feb. 1979 *Montana Outdoors* article ("Was a Wolf Killed in Valley County?") in "The Catchall" section, a number of wolf stories have been brought to the attention of the Glasgow regional office. Most are impossible to confirm or deny. Several rumors also surfaced that the FWS or the Montana Department of Fish, Wildlife and Parks had reintroduced wolves into the Missouri Breaks area south of Fort Peck Reservoir. These rumors are unfounded. Neither agency has introduced wolves anywhere in Montana, nor are there any immediate plans to do so.—*Mike Aderhold, Region 6 (Glasgow) information officer*

Contributors

Eastern Montana has the attraction of some unique state parks and monuments. They offer the visitor a chance to see water-sculptured rocks, geologic diversity and sites that reinforce earlier history lessons. Far from being a desolate no man's land, this part of the state is filled with "Natural Wonders, Historical Treasures," as **Dan Vincent** points out in his article, beginning on page 2. Vincent was the department's parks manager for the Miles City region and has recently taken a similar post in Great Falls.

Four decades ago, the raccoon was totally unknown in Montana; today, this "Masked Bandit of the Night" has been documented throughout the state. As **Frank Gjersing** writes, "With the wide range of food and cover it can use, it has been able to adapt to changes in land use." Gjersing, a fish and wildlife biologist for the department, is stationed in Havre. Turn to his article—another in our nongame series—on page 11. *Montana Outdoors* extends thanks to **Takehiro Taira**, Kalispell artist, for his front cover painting of the raccoon.

With "Mountain Goats on the Move," **Bob Cooney** begins a series of recollections about the early days in the Department of Fish, Wildlife and Parks. Now retired, Cooney joined the department in 1940 and worked in the Game Management Division (now Wildlife Division) for 25 years, so his reminiscences are laced with many personal anecdotes. Turn to page 12 for the story of the first trapping and transplanting of mountain goats in Montana.

Over the years, visitors to the legendary ghost town of Bannack watched Grasshopper Creek change in color from a muddy red-brown to a deep crimson. Sediment and heavy metal particulates from old mining wastes had destroyed the aquatic insects in the lower creek and had made quality fishing a thing of the past. But because of the cooperation of several agencies, "A Rebirth for Grasshopper Creek" is now a possibility. As **Brad Anseth** and **Bill Phippen** note in their article beginning on page 14, the project has served "as an effective model for environmental reclamation everywhere." Anseth is the public information specialist for the Soil Conservation Service in Bozeman. Phippen, a former *MO* intern, is a public relations writer with Flathead Data Research, Kalispell.

The General Mining Law of 1872 was established to promote mineral exploration by citizens who then did not have the technology to affect thousands of acres in a single development. Today, things have changed and mineral development in the Cabinet Mountains in northwestern Montana is posing a substantial threat to the area's wildlife and wildlife habitat. Turn to **Gayle Joslin's** article, "Outdated Mining Law Threatens Wildlife," on page 22. Joslin, a wildlife biologist for the department, is studying mountain goats in the Cabinet Mountains and the effects of various land uses on them.

James Williams would be the first to admit that fly-fishing has a mystique all its own. He also learns that joining the ranks of the purists—the great fraternity of true sport fishermen—requires more than a snappy rod and a full fly book. An avid outdoorsman who terms his success "at best only moderate," Williams is a fireman with the Anaconda Company in Butte. Turn to "Confessions of a Fledgling Fly-Fisherman" on page 28.

Meriwether Lewis described it as a "noble" stream. Anglers across the country regard it as prime blue ribbon trout water and as one of the state's finest wild trout rivers. "What Does the Future Hold" for the Madison River? Beginning on page 31, **Dick Vincent** speculates about some of the answers. Increased fishing pressure, changing demands on water flows, increased development in the floodplain, changing scenic values and increasing water temperatures in the river below Ennis Reservoir are only a few of the problems currently facing the Madison. As he concludes, ". . . the future of the Madison River is in the hands of those who use and enjoy it." Vincent, a fisheries biologist working in Bozeman, has studied the Madison River since 1966.

Cavity nesters are "Part of Montana's Bird Heritage." These interesting and beautiful birds—woodpeckers, chickadees, nuthatches and many others—require cavities in old-growth forests for their nests and other activities. But perpetuating old-growth forest doesn't mesh with the trend of converting old growth to younger stands. To learn more about these fascinating creatures and the threats to their habitat, turn to **B. Riley McClelland's** article on page 34. An assistant professor in the School of Forestry at the University of Montana, Missoula, McClelland has been studying the ecology of cavity-nesting birds in northwestern Montana for the past six years. His research has been supported by the Forest Service, the Montana Cooperative Wildlife Research Unit and the School of Forestry.

Masked Bandit of the Night

by Frank Gjersing

IT WAS A WARM summer morning as I sat beneath an old cottonwood enjoying the sunlight that filtered through the branches overhead. In the distance, a woodpecker hammered in its incessant search for food and an echo answered from the nearby hills. A string of walleyes and catfish collected from my set lines moved slowly in the gently flowing river in front of me. At this moment, life seemed perfect.

As I sat there, I soon realized I was not the only one enjoying the sun's warmth. An unusual thickness in the branch directly above me formed itself into a fat, catlike animal which rose, stretched and calmly ambled back along the branch to disappear into a hole. Picking up a stick, I tapped the base of the old tree. Immediately, three greyish-white faces with black masks appeared. The shiny black eyes and pointed snout ending in a button nose added to their mischievous appearance. Soon, curiosity satisfied, the raccoon family retired into their hole for their normal daily sleep.

During the summer, life is fairly easy for the raccoon (*Procyon lotor*). Except for feeding after sunset and before sunrise, life is lazy. With the onset of fall, appetites become ravenous as they prepare for the approaching winter, and they may feed from evening throughout the night and into early morning. Their favorite food haunts include streams and river bottoms. Aided by toes more nimble than human fingers and an acute sense of touch, they capture crayfish and minnows from under rocks. When the opportunity presents itself, they eat fruit, nuts, carrion and small birds and mammals. But it is the raccoons' forays into cornfields and poultry yards which get them into trouble. A 3½-inch hole in a henhouse is large enough for a small raccoon to get through; once inside, it frequently kills more than it eats. Corn seems to be a delicacy and the raccoon may strip many ears, but take only a few bites.

Raccoons frequently "wash" their food before eating it—they place it in water, turn it over and move it around with their front paws. In fact, their species name "*lotor*" means "washer." The washing action occurs not because of a lack of saliva (as is frequently believed) nor because they want their food to be clean (they do not always wash it). Apparently, it is just a characteristic unique to raccoons.

Fall is also the time of the year when "coon hunting" with dogs comes into full swing in many parts of the United States. These hunts have resulted in many legends of "giant coons." Although the average weight of an adult raccoon is only 12-19 pounds, any hunter who has carried one through a pitch-black, brier-filled swamp for five miles on a cold fall night surely has the right to say his "coon" weighed 50 pounds.

Probably the most important method of harvest is trapping. The raccoon's curiosity makes this fairly easy because it will investigate almost any shiny object such as aluminum foil or a broken piece of mirror fastened to the pan of a trap. Plus, its voracious appetite in the fall makes food baits of meat and corn extremely attractive.

Throughout the United States, the harvest of raccoons has been increasing because of accelerating demand for long fur. During the fall, winter and spring of 1970-71, approximately 1.1 million raccoons were harvested in this country, with Montana contributing an estimated 1,695. By 1977-78, the nationwide harvest was over 3 million, with 7,942 the total for Montana. The rich fur—a brown, woolly undercoat topped with white- or grey-tipped guard hairs on the belly and black-tipped on the back—is excellent for winter clothing. The bushy tail with its four to six prominent black rings usually ends up adorning a coonskin cap. Not only is the fur valuable, but many people consider the meat excellent. But the taste for raccoon is not limited to man—great horned owls, foxes, coyotes, wolves, fishers, bobcats and mountain lions occasionally kill raccoons.

When winter comes, life changes dramatically for the raccoon in the northern states. It seeks a hollow tree, an abandoned burrow or an empty cave for a den. The food not used to maintain body processes is now stored in large fat deposits under the skin, in the abdominal cavity and around the tail. The total fat content may comprise up to 40% of the animal's weight at this time. For these animals, life is easy. Although not true hibernators, raccoons curl up and enter a lethargic sleep, venturing out only during mild spells and the breeding season.

For animals in marginal habitat or those in areas where competition for food is high, life is hard. They have little stored fat and must leave their dens to search for food or lose weight directly from vital tissues. In either instance, many die.

With spring's arrival, raccoons search for food on every warm night. The pregnant females become heavy and irritable. Any young of the previous year which seem too close are driven from the den site to search for dens on their own. They often show up in culverts, wood duck nesting boxes, drain tiles, garbage cans or anything that will serve as temporary shelter. From one to seven young are born in April or May, after a gestation of 63 days. They are born completely covered with fur and with their eyes closed. After about three weeks, their eyes open, and within two months they are hunting with their parents. For the first time, their Sioux name of "wica," meaning "little man," seems deserved. Their tracks in mud, especially those of the hind feet, look very much like a human baby's, except the toes are longer.

The raccoon's intelligence is one of the highest in the animal kingdom and seems to have reached its pinnacle in the ability to pick crude locks and hasps on cages and old farm buildings.

During this time of year, raccoon populations reach their greatest density. Population density usually averages two families (about 10 raccoons) per square mile of good habitat, but densities as high as 53 animals per square mile have been recorded in superior habitat.

The present range of the raccoon extends throughout southern Canada, all of the lower 48 states and south into most of South America. In Montana, the raccoon was totally unknown 40-45 years ago; by 10 years ago, it was documented throughout the state. With the wide range of food and cover it can use, it has been able to adapt to changes in land use. This, coupled with proper management, means the "masked bandit of the night" will be around for a long time. ■

Mountain Goats on the Move

by Bob Cooney

IT WAS NEARLY 40 years ago, but I can still vividly recall the sound of that trap gate banging shut. I had pulled so hard on the trip wire that I wound up flat on my back.

My partner Ray Gibler and I were jubilant as we looked down at our capturing pen on the Deep Creek bench in the Front Range of the Rockies west of Choteau. There, securely inside, were four Rocky Mountain goats. These were the first of this big game species to be live trapped in the state and, as far as we knew, the first in the West. What a struggle it had been!

When I joined the Montana Department of Fish, Wildlife and Parks in 1940, one of my first assignments was to work out some way of capturing and transplanting mountain goats. The Big Timber Rod and Gun Club raised $500 to help with the project; Barney Brannin, a rancher in Sweet Grass Canyon, and Ed Cole, a druggist in Big Timber, were leaders in gaining support for this project. The first transplant was set for the Crazy Mountains north of Big Timber.

Distribution of mountain goats in Montana in those years was rather limited. They were found from the Canadian border south along the Continental Divide to the Dillon area. Others were located in several mountain ranges to the west and into Idaho. This left a vast area of suitable mountain country east of the divide completely devoid of goats. We found no historical evidence of prior inhabitations in the Beartooths, Absarokas, Taylor-Hilgards, Crazy Mountains, Tobacco Roots and many others. To move goats into these seemingly ideal areas presented a real challenge.

The first problem was locating a suitable trapping site. I explored a number of promising areas, including the east face of the Bitterroots, the south edge of Glacier National Park and the Pintlars. But none worked out.

Things began to look pretty discouraging and I was receiving a lot of kidding about not being able to catch those wily mountain goats. At last, the project got a break. Someone in Choteau suggested I talk with J. C. Salmond who ranched near the mountains to the west.

I remember standing in his front yard while J. C. pointed out a high bench on the east slope of the Rockies in the Deep Creek drainage. He said for many years they had put stock salt up there for the cattle and that goats sometimes used it.

It was a scramble to climb up there, but well worth the effort. A small group of mountain goats was busily licking the soil where the salt had been placed the summer before.

This small, two-wheeled cart, made from the front part of a wagon, was used to carry trapped goats from the high Deep Creek bench. (DFWP photo: Bob Cooney)

Things happened pretty fast after that. Bob Neal, Bruce's son who had been working with his dad on the Sun River elk herd, came up to give me a hand. We constructed what we hoped would be a successful capturing pen. We included the lick and made the trap 45 feet long, 25 feet wide and about 11 feet high. It was built of posts, poles and woven wire. We had trouble getting the woven wire up there, so J. C. let us use one of his teams. We hitched it to a two-wheel cart made from the front part of a wagon. The bench where we built the trap was part of the main range and quite high. The way to the top was more like a steep, washed-out trail than a road.

When the trap was finished, we put a block of salt in it and set the gate. It could be dropped by pulling a trip wire which ran to a lookout about 300 yards from the trap.

A few days later, Ray, a packer in the Teton Canyon area, and I carefully sneaked to the little knoll where the trip wire was located. As we eased over and looked down on the trap, we were delighted to see three goats licking the salt inside. To our dismay, however, another goat—a big billy—was standing nonchalantly halfway in the gate. Our chief concern was that the three would get their fill of salt and wander out before the big fellow decided to make a move and we didn't want to drop the heavy gate on top of him. At last, he deliberately stepped inside.

At that moment, I gave the trip wire that tremendous tug.

As we walked toward the trap, we were very excited and pleased, even though we were both wondering how we were going to get the goats into crates, off the high bench and into our pickup.

We wasted no time getting the cart up there, this time filled with crates. I remember we weren't too sure of our measurements in making those crates. We hadn't yet handled any live specimens, so we had to take our measurements from the rather disheveled, full-mounted goat which stood in the Capitol rotunda. When we got a close look at the billy in the trap, we began to wonder if he would fit into one of those crates.

Fortunately, Ray was good with a lariat. From the top

Sometimes the cart was unable to navigate the terrain, so the crated goats had to be brought down from the trap site on pack horses. Author Bob Cooney tied the goats' heads around a bit to the side so they wouldn't give the pack horses a bad time. (DFWP photo)

of the pen, he tossed the rope over the billy's sharp horns. We managed to thread the rope through a crate we had carefully pushed into the pen. Although it was a tight squeeze, we finally pulled him in. We gradually got a little bolder and found if we could get a good grip on the horns, we could handle the smaller goats fairly easily.

We were impressed with the speed and power with which the goats could deliver an upward thrust of the head, making those needle-sharp horns especially dangerous. It was easy to see why mountain goats had the respect of even the larger predators of the high country.

We had to stack the crates on top of one another to fit them into the cart. It was a top-heavy "vehicle" that started down the mountain. J. C. had come up to help us and he kept the cart in check with his saddle horse. Barney and I hung onto the sides and Ray drove the little team from a precarious seat on top of the crates. With a lot of slipping, sliding and plenty of luck, we made it down to the pickup. It was after midnight when we finally arrived in Big Timber.

The next morning, quite a group of interested sportsmen accompanied us. We crossed the Yellowstone River and went up to Sweet Grass Canyon on the east slope of the beautiful Crazy Mountains. We found a good release site just above the Brannin Ranch where a steep slope led to the rocky peaks above.

Everything was going well. The big billy lost no time getting out of his crate and up the mountain. One of the nannies and the yearling quickly followed. Then came problems. The other nanny had been lying in her crate, so we had to pull her out by the horns. But she continued to lie motionless, with her eyes closed. I remember thinking—here we are making our first mountain goat transplant with a lot of folks looking on, and now this fine animal might die. We decided to step back and stand perfectly still. In a moment or two, her eyes opened cautiously. In the next instant, she was on her feet and running up the mountain toward her new home.

In a couple of weeks, we caught eight more goats and released them in the same place. This was the beginning of a highly successful introduction into the Crazy Mountains.

The next year, with help from the local sportsmen's club, we transplanted goats into the Beartooth Mountains near Red Lodge. Snow lingered that spring near our trap and we were unable to get the cart up there. We had to bring the crated goats down on pack horses, but our original crates were unusable because they were too long for the horses to carry. We designed shorter crates, but the goats' heads and necks extended out through the backs. The goats were comfortable enough, but if we hadn't tied their heads around a bit to the side, they would have given the pack horses a bad time.

It has been interesting to think back on those beginning years of a program that has come so far. About 400 mountain goats have been trapped and transplanted into a number of new ranges in the state. Crates of light aluminum tubing, designed by Rex Smart in the department shop, have replaced the wooden crates of long ago.

Jim McLucas has been in charge of this program for many years. He and those who have worked with him have developed important refinements. For instance, they found that a short section of garden hose pushed down over the deadly sharp horns protects the goats from injuring each other and means they no longer have to be transported in individual crates. Temporary holding pens are now constructed at the release sites where the goats can settle down. When the gate is quietly opened, the goats usually move as an orderly group up onto their new ranges.

A device within the capturing pen now makes it possible for the goats to trip the gate themselves—a vast improvement over someone tediously waiting on a windy knoll to pull the trip wire. Plus, it works 24 hours a day. In the more recently constructed capture pens, netting has replaced wire.

The original trap site on the Deep Creek bench is still used, but a four-wheel drive pickup has replaced the little team and pack horses. Trapper and Canyon creeks in the Pioneer Range have been another good capture site.

I think Jim would agree that some of the most interesting work was done many years ago on the South Fork of the Flathead River. Here, a trap was built around a natural lick on the west side of the river just above its junction with the Little Salmon. The goats taken there experienced many modes of transportation.

They were moved, two crates at a time, down the fast-flowing South Fork in a rubber raft. About nine miles downstream, they were brought ashore at the Black Bear Forest Station. They were then tranquilized and loaded into a small plane. One group was flown to Helena where they were taken by pickup to the Gates of the Mountains landing, then by boat down the canyon to the release site. It would be fun to think that some stories of that adventure are handed down through the several generations of goats that have done so well there.

The introduction of mountain goats into many new ranges has greatly increased the possibility of seeing these spectacular dwellers of the high country. Hunting opportunities have also been expanded. It was a great experience to have been part of this program's beginning. ■

A Rebirth for Grasshopper Creek

by Brad Anseth and Bill Phippen

GRASSHOPPER CREEK. From its source in the Pioneer Mountains of southwestern Montana, it wends its way to the Beaverhead River 40 miles to the southeast. Along the way, its brisk water cuts and splashes through the Beaverhead National Forest and through the legendary ghost town of Bannack.

A beautiful sight? Well, partly. The upper stretches of the creek, where the water flows clear and brook trout grow fat and sassy, are indeed picturesque. Those stretches below Bannack, at least for the last few decades, have been anything but. Visitors to the old mining town over the years have watched this part of the creek change in color from a muddy red-brown to a deep crimson. Ugly.

Only a few years ago, biologists considered this portion of the creek virtually lifeless. Large amounts of sediment and toxic heavy metal particulates, flushed into the creek from long-abandoned mining wastes, had exterminated most of the lower creek's life forms and had made quality fishing a thing of the past. The aquatic insects that form such an important part of a trout's daily diet were all but eliminated—and with them the trout. Fortunately, due to the combined efforts of the Headwaters Resource Conservation and Development Program (RC&D), the U.S. Soil Conservation Service (SCS), the Montana Department of Fish, Wildlife and Parks (DFWP) and the Beaverhead Conservation District, Grasshopper Creek now seems on its way to a rebirth.

The problems at Grasshopper Creek, as with many other streams affected by mining waste pollution in Montana, are historical. Since the first miners came to Montana pursuing their elusive dreams, mine tailing and other forms of pollution have transformed parts of the Montana countryside into ecological and aesthetic nightmares. Wastes were abandoned at the mining sites or pumped into rivers and streams to be carried and deposited elsewhere. Streams were diverted to reduce water flow, thus providing easier access to their hidden treasures. Water was also needed to flush the milling machinery and carry away slurry. To the miners of those days, environmental degradation was not a consideration—or at least it didn't seem to be. The amount of untouched land under the "Big Sky" was immense, and when one area "played out" or was found lacking in minerals, man, his tools and later his machines merely moved on.

Such was the case at Bannack. In 1863, when mining near Bannack was at its peak, this first territorial capital of Montana saw over 5,000 prospectors staking claims to sections of Grasshopper Creek and the surrounding sage-covered hills. Three years later, however, when Bannack's diggings played out, the miners moved on to new strikes, leaving the once-booming, bustling mining center an historical relic almost overnight. Where thousands had once sought their fortunes, only a few stayed to mine what little ore remained. By the early 1930s, Bannack had been completely abandoned.

Unfortunately, the miners left more than a picturesque ghost town behind them. On a hill above Grasshopper Creek, just out of view from Bannack, sits the deteriorating Gold Leaf Mill. This mill once separated gold and silver from the ore that miners wrested from the hard rock mines in the area. The milling process was time-tested: Crush the ore, run it through solutions of heavy metals and wait for the gold and silver to combine with the heavy metals and drop out.

During its journey through the mill, the crushed ore was reduced to rock "flour," which with other wastes and tailing was flushed from the machinery as a slurry and run into a tailing pond. Unfortunately, this slurry also contained some heavy metals, including lead, copper, zinc, arsenic, iron, mercury and others not extracted in the milling process. Once in the tailing pond, water from the slurry evaporated, and the red waste sediments, containing heavy metals, settled out. Over the years, these sediments accumulated to depths of from three to 10 feet in the Gold Leaf Mill slurry pond next to Grasshopper Creek.

Grasshopper Creek is a dynamic stream: Although it is docile during most of the year, spring run-off converts it into a raging, debris-laden torrent. Although the mill's tailing pond was originally designed so the wastes would not enter Grasshopper, the grinding and gouging effect of the annual spring floods gradually ate through the protective barrier between the creek and the pond. Silt and tailing began to seep into the creek, turning the water red and killing aquatic life. In addition, direct run-off coursing through the tailing piles has periodically washed sediment into the creek.

Although this mine waste has been polluting Grasshopper Creek for many years, only recently has the problem come under close scrutiny. A study conducted by the Environmental Protection Agency (EPA) in 1970 showed that flesh of fish in the Beaverhead River below the mouth of Grasshopper Creek, as well as in the creek itself, contained levels of mercury higher than the federal Food

Near its confluence with the Beaverhead River, Grasshopper Creek (top, DFWP photo: Norm Peterson) was tinted red during spring floods because of high concentrations of heavy metals deposited in a mine tailing dump near historic Bannack. Flood waters carried the metals downstream. A cooperatively financed effort by the Headwaters Resource Conservation and Development Program and the Department of Fish, Wildlife and Parks stabilized the banks (middle) to enhance downstream water quality and the stream's fishery (bottom) (photos courtesy of the Soil Conservation Service).

and Drug Administration's recommended tolerance limit of 0.50 parts per million (ppm). In fact, the mercury level in one sample was almost three times this limit.

Additional studies in summer 1973 by the Montana Department of Health and Environmental Sciences Water Quality Bureau determined that Grasshopper Creek contributed a significant sediment load to the Beaverhead River as well. Turbidity problems in the creek seemed to be caused by erosion of loose soils in the mining spoils area and a lack of vegetative cover brought about by the mining wastes and overgrazing by livestock.

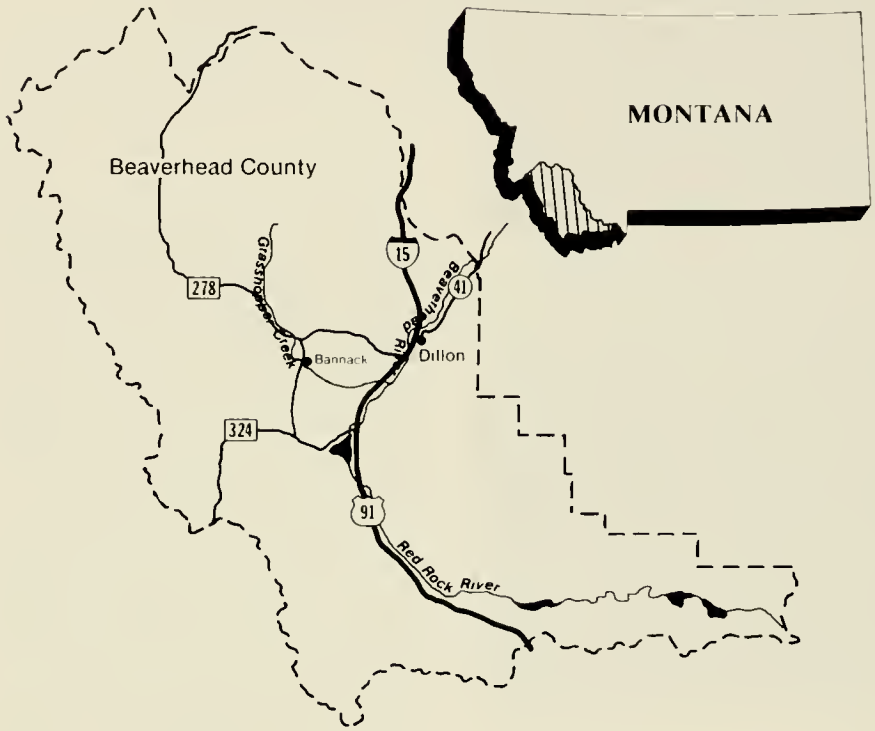
Although it was obvious to EPA scientists that fish in the Beaverhead River and Grasshopper Creek were collecting mercury from the stream, where it was coming from and how it was being assimilated were not immediately apparent. Experiments showed that the waters of Grasshopper Creek—even downstream from the mill—did not contain an inordinate amount of mercury.

DFWP biologists in the Bannack area had long believed that the mercury problem originated with the tailing piles at Bannack, and that the fish were somehow incorporating this mercury into their bodies.

"It was obvious to us that the problem was coming from those tailings," said Norm Peterson, habitat preservation coordinator for the department's Fisheries Division, "and we hypothesized that the fish must be taking the mercury in through their food chain." Peterson, who was a fisheries biologist in Dillon at the time of the EPA study, explained that mercury-containing sediments from the tailing piles would coat the vegetation in the creek, which would in turn be eaten by the creek's aquatic insects. These insects would then be consumed by the fish, which assimilated the mercury into their flesh.

A sediment analysis by the Montana College of Mineral Science and Technology in summer 1976 supported this hypothesis. The analysis showed that concentrations of lethal heavy particulates within the sediment were much greater below the old Gold Leaf Mill tailing pond than above. Concentrations of

the deadly element arsenic, for instance, were 5½ times greater below the tailing piles than above (220 vs. 40 ppm). The amounts of zinc and mercury, both particularly toxic to fish, were twice as great below the tailing. Iron concentrations increased about four times. Lead and copper showed the greatest changes, increasing from 45 and 17 ppm above to 404 and 505 ppm below, respectively.



Realizing this problem would have to be solved if the water quality and fisheries within Grasshopper Creek and the Beaverhead downstream from its confluence with Grasshopper were to be improved, the DFWP, the Beaverhead Conservation District and the SCS drew up a treatment plan for the creek.

This proposal, written in September 1976 and submitted as a critical area treatment plan to the Headwaters RC&D Council in Butte, outlined procedures through which a portion of Grasshopper Creek would be riprapped with angular rock and a diversion channel installed. The riprap would prevent further erosion into the heavy metal-bearing stream banks and the diversion channel would divert overground run-off before it reached the tailing pile and could pick up the toxic heavy metals.

As stated in the plan, developed by Larry Babich and other SCS engineers, three sections of riprap totaling 1,400 feet would be placed on the creek banks adjacent to the tailing piles and a 1,400-foot diversion ditch would be excavated along the base of the foothills above them. Total expenses for the project were estimated at $64,000, with federal RC&D funding, administered by the SCS, to provide 75% of the money and the DFWP to provide 25%. (Actual construction and administrative costs, however, amounted to about $50,000 or less.)

With acceptance of the proposal by the Headwaters RC&D Council, work on the riprap and diversion channel began in fall 1976 and was completed by the next spring. All areas disturbed during construction were seeded with a mixture of grass species to restore the bank cover and thus lessen erosion. Willow trees along the riprapped sections had been protected during construction. Besides providing shade for the creek to help keep the water cool (an essential for trout habitat), tree roots should spread through the blanket of rock and aid in keeping the bank in place.

Although the tailing piles at Bannack have now been largely isolated from Grasshopper Creek and the sediment-bearing run-off almost entirely channeled away, the waters of Grasshopper Creek will not turn sparkling clear and harbor large populations of trout overnight. According to Earl Love, district conservationist for the SCS in Dillon, it may take a number of years for the stream to return to its original condition. Love explained that contaminated silt and sediment that had accumulated over the years would still affect the creek's water quality for a few more years, but that its quality should gradually improve. Water from the 1978 spring run-off, he said, gathered much of the deposited sediment and carried it downstream where it was diluted. "Subsequent run-offs," he continued, "should eventually return this section of Grasshopper Creek to its former status as a wild trout fishery."

How long this will take depends on a number of variables. According to Jerry Wells, DFWP fisheries biologist in Dillon, the most important factors are the magnitude and duration of run-offs in the spring. "Right now," he said, "there is a dearth of fish below the tailings, but if the riprapping job continues to hold, we might expect a response by aquatic invertebrates and fish within the next few years as the system begins to flush itself out."

Quantitative data on the fish and invertebrate populations in Grasshopper Creek should be available in 1979, Wells said, and from them, fisheries personnel may be able to tell how effectively the riprap job is improving the fishery.

Where Grasshopper Creek flows past the old Gold Leaf Mill, the waters are becoming visually cleaner by the day. But only time will tell if the riprap walls and the diversion ditch constructed at Grasshopper Creek will ever be able to return the creek to the quality trout stream it once was. What is certain, however, is that construction activities at the creek and the interagency cooperation which accompanied the project can serve as an effective model for environmental reclamation everywhere. ■

Shorebirds of Montana

WILSON'S PHALAROPE *(Steganopus tricolor)*

"I shall never forget my first impressions of a prairie slough with its teeming bird life, an oasis of moisture in a sea of dry, grassy plain . . . . the almost silent, gentle, dainty, little phalaropes stand out in memory as charming features in the picture, so characteristic of western bird life."

Thus did ornithologist Arthur Cleveland Bent describe the Wilson's phalarope in 1927. This graceful, eight- to 10-inch bird can still be seen floating buoyantly on the prairie ponds of Montana, sometimes whirling around and around like a paper boat caught in the wind. The whirling serves a useful purpose, for it stirs the bottom of shallow pools, bringing insect larvae to the surface.

The Wilson's phalarope is characterized by an unusual reversal of roles, in that the female is not only larger and more brilliantly colored than the male, but also delegates to him the tasks of nest building, egg incubating and rearing of the young. (photo: Alan Nelson)

When shorebirds are mentioned, some people think of herons, rails, gulls and terns, or even ducks, geese and swans. But technically, these are not shorebirds.

What, then *is* a shorebird? According to Gardner D. Stout, editor of "The Shorebirds of North America," the shorebirds of our continent comprise six bird families: the plovers and their allies, the sandpipers and their allies, the stilts and avocets, the oystercatchers, the jacanas and the thick-knees. Of these, the latter three families do not breed in or migrate through Montana. The remaining three families include, in addition to plovers, sandpipers, stilts and avocets, such exotic-sounding birds as turnstones, phalaropes, curlews and godwits. We are pleased to present photographs and descriptions of several Montana shorebirds on the following pages.

While they vary considerably in shape, size and behavior, shorebirds possess several common traits. They tend to favor open areas, usually close to

water. Most are equipped with long legs for wading; narrow, falconlike wings, and well-developed flight muscles for rapid, sustained flight during migration. Many shorebirds have superb protective coloration, usually mottled browns and grays above with lighter tones below. They frequently breed in the far North, nest on the ground and lay four eggs. The young are precocial—some are able to walk and even catch insects the first day of their lives. The young can usually fly by the end of two weeks, and are completely on their own within three or four weeks.

Once present in North America in vast numbers, shorebirds were depleted by

LONG-BILLED CURLEW *(Numenius americanus)*

The long-billed curlew perhaps embodies the wind-swept spirit of the prairie more than any other shorebird. Once crossing the plains in large migratory flocks, these unwary birds made tempting targets for western settlers and market gunners. Their populations declined drastically as a result, but fortunately didn't disappear.

Standing 15 inches tall with a wingspread of up to 40 inches, the long-billed curlew is a giant among shorebirds. During nesting, it defends its prospective family vigorously, attacking anything that comes near. The downcurved bill may be more than eight inches long, giving rise to the nickname "sicklebill." Although it sometimes feeds on insects and berries, the curlew uses the long "sickle" most effectively in probing wet spots for worms, grubs and crustaceans.

The long, curved bill and the clear, prolonged cry of "curl-e-e-e-u-u-u" *rolling across the prairie make the long-billed curlew one of Montana's most distinctive shorebirds.* (photo: Alan Nelson)

UPLAND SANDPIPER *(Bartramia longicauda)*

"The ecstatic upland plover, hovering overhead, poured praises on something perfect: perhaps the eggs, perhaps the shadows, or perhaps the haze of pink phlox that lay on the prairie."

—Aldo Leopold, "A Sand County Almanac"

This large, brown sandpiper, formerly called the upland plover, can often be seen perched on a post overlooking its grassy domain, or flying slowly over the breeding grounds, fluttering the tips of its long, pointed wings and pouring forth its liquid song of courtship. The female lays her four spotted, buffy eggs in a grass-lined depression, often miles from the nearest water.

Although it was heavily harvested by market gunners in the late 1800s, the upland sandpiper has made a comeback. This should please farmers as well as birdwatchers, since the upland sandpiper destroys vast numbers of grasshoppers, locusts and other insects. (photo: Alan Nelson)

AMERICAN AVOCET *(Recurvirostra americana)*

This tall, elegant bird, with its long, slender legs, chestnut head and upcurved bill is among the most beautiful of shorebirds. Often found in the muddy shallows of alkaline lakes or in wet meadows dotted with pools, the avocet is equally at home in the air, on land or in the water.

When it feeds, the bill is held below the surface with the lower curve nearly touching the bottom. The avocet runs slowly, sweeping its bill from side to side, not unlike a farmer scything hay. Aquatic foods, primarily insect larvae and crustaceans, are thus located by touch rather than sight.

Highly social birds, avocets sometimes feed in flocks of more than 100, presumably driving food in front of them as they march in step through the shallows. (photo: Harry Engels)

MARBLED GODWIT *(Limosa fedoa)*

*Among the largest of our shorebirds, the marbled godwit measures 16-20 inches in length. It gets its name from the loud flight call, "*god-wit! god-wit! *" whistled sharply with emphasis on the last syllable.*

Marbled godwits breed on the prairies, meadows and pastures of the northern plains, usually nesting on high ground not too far from water. They breed as far south as central Montana, and are often observed at the Bowdoin National Wildlife Refuge near Malta.

Unlike the bill of the curlew, which turns down, the marbled godwit's bill curves slightly upward. Seen in profile stalking across the prairie, it can easily be distinguished from the long-billed curlew. (photo: Alan Nelson)

market gunners throughout the 19th century. By the early 1900s many species were, in the words of naturalist Peter Matthiessen, "fluttering at the edge of the abyss." Concerned sportsmen and conservationists began to fight for protection of shorebirds, and by 1930 all except snipe and woodcock had been placed under the protection of the Federal Migratory Bird Treaty Act.

Of the 40 species of shorebirds reported in Montana, 12 are known to breed in the state: piping plover, killdeer, mountain plover, common snipe, long-billed curlew, upland sandpiper, spotted sandpiper, willet, marbled godwit, American avocet, black-necked stilt and Wilson's phalarope. Others, such as the semipalmated plover, least sandpiper, long-billed dowitcher and sanderling, migrate through Montana on their way to and from the breeding grounds.

The sights and sounds of these gentle, graceful birds are an integral part of Montana's prairies and lowlands.—*Dave Books* ■

Mineral Development in the Cabinets:

Outdated Mining Law Threatens Wildl

FIFTEEN HUNDRED FEET below our rocky perch in northwestern Montana's Cabinet Mountains lies a deep velvet forest interspersed with cascading emerald creeks. As we peer down through the twilight mist, we catch a glimpse of movement, then the creamy-tan rump patch of an elk. Closer scrutiny reveals several elk feeding, standing and bedded. Above our heads, seven merlins dive, twist and soar, while eight white dots—mountain goats—move slowly across the lush terraces of the dome-shaped mountain behind us. On the way up the mountain, we had startled a four-point mule deer buck, whose noisy departure sent pikas to their rocky sanctuaries. The country abounds with wildlife this balmy August evening.

It is difficult to imagine that within six months as much as 700 inches of wet snow will fall here, and that the snowpack will exceed 10 feet. By then, the elk will have moved down to more hospitable areas, as will all the animals not adapted to a winter of hibernation or subsistence beneath the snow.

Across the drainage, scalloped peaks show evidence of alpine glaciation, while the major valleys reflect the trenchlike scouring of continental glaciers. In absolute height, the Cabinets are lower than many mountains elsewhere in Montana, but for sheer relief few ranges are more dramatic. The lowest elevation in the state—1,820 feet—occurs at the Idaho border where the Kootenai River leaves Montana; yet many peaks in the Cabinets flanking the south side of the Kootenai rise to over 8,000 feet.

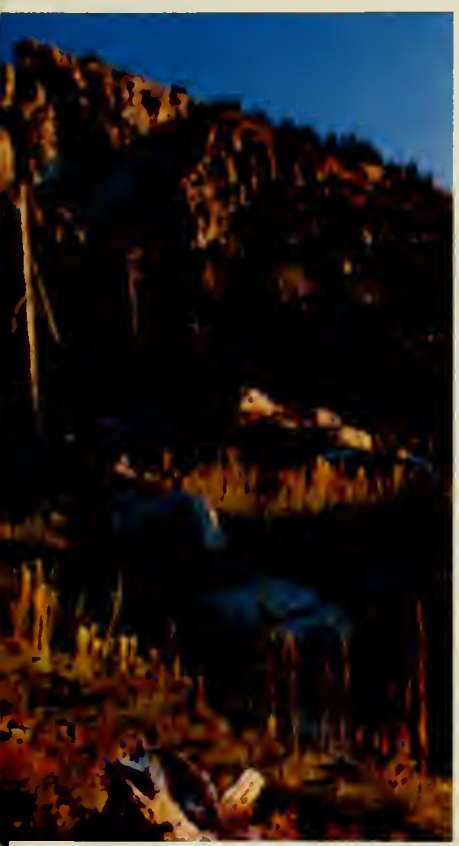
The Cabinet Range is about 100 miles long and 30-40 miles wide. It runs northwest-southeast, with the northwest portion of the range lying just south of the Kootenai River near Libby. The Cabinets are bisected by the broad Lake Creek-Bull River Valley, which itself is divided by an ancient glacial moraine. This moraine causes Lake Creek to flow north to the Kootenai River and the Bull River to flow south to the Clark Fork River. Snowshoe Peak, which lies in the heart of the Cabinet Mountains Wilderness, is the tallest peak in the range at 8,712 feet.

The mountains of northwestern Montana act as natural barriers, purging the Pacific weather systems of their moisture as the air masses move eastward. In winter, these mountains serve as a snowy reservoir; in spring, they release their storehouse of water to the valleys below. Because of these climatic features, the Kootenai watershed is densely forested.

According to early explorers such as Meriwether Lewis and William Clark, Alexander Ross and David Thompson, game in the mountains was less abundant and more difficult to bag than it was on the plains farther east.

But time has a way of reversing trends: The once-abundant wildlife of the plains is now almost gone, and what was once considered a mountainous wildlife desert is now esteemed as prime wildlife habitat. As civilization forged westward and the wildlife of the plains diminished, wildlife which occupied the less hospitable mountainous terrain persisted because of greater security. Security, however, is a relative concept. As the levels of supply and demand flex with the times, natural

e by Gayle Joslin



resources once considered unprofitable to procure are now economically feasible to extract. The Cabinet Mountains are only now beginning to experience the pressures of large-scale demands.

Tremendous geological forces have combined to produce the rugged relief of the Cabinet Mountains. Uplifting and down-dropping of fault blocks; folding, fracturing and crumpling of the earth's surface, and intrusions and eruptions of molten rock have helped to shape the escarpments, jagged pinnacles, cirque cliffs and broken talus slopes. These forces are also responsible for the mineral deposits that underlie the area.

Dozens of drainages in the Cabinets are intersected or controlled by faults. A relationship exists between the occurrence of faults and the existence of minerals.

Chicago Peak (left), in the rugged Cabinet Mountains Wilderness, is the site of current test drilling for copper and silver. The Bull River Valley (below), which abounds with wildlife, is flanked by the Cabinet Mountains Wilderness on the east and the proposed Scotchman Peaks wilderness on the west. (photos: Lance Schelvan)

Copper and silver are often deposited along faults, where superheated subterranean water takes up minerals in solution, then courses through the fissured rock. The minerals are either deposited in cracks (the case with silver) or they replace the country rock (the case with copper). Mining shafts in the Cabinets have already produced several million dollars worth or ore. According to Uuno Sahinen, former director of the Montana Bureau of Mines and Geology, "The region has a much greater potential for future production."

Although northwestern Montana's mining history dates back to the 1870s, only recently have massive copper and silver developments been planned for the area. In 1958, three mineral claims were staked on Mount Vernon, and an additional 52 claims were staked in the same vicinity in 1963 and '64. Bear Creek Mining Company, an exploration firm and a subsidiary of Kennecott Copper Corporation, acquired these claims and in 1968 constructed a winding, switchback road up the Ross Creek face of Mount Vernon and another up the Stanley Creek face. These roads provided access for diamond drilling equipment and to tunnels that were to confirm drilling results.

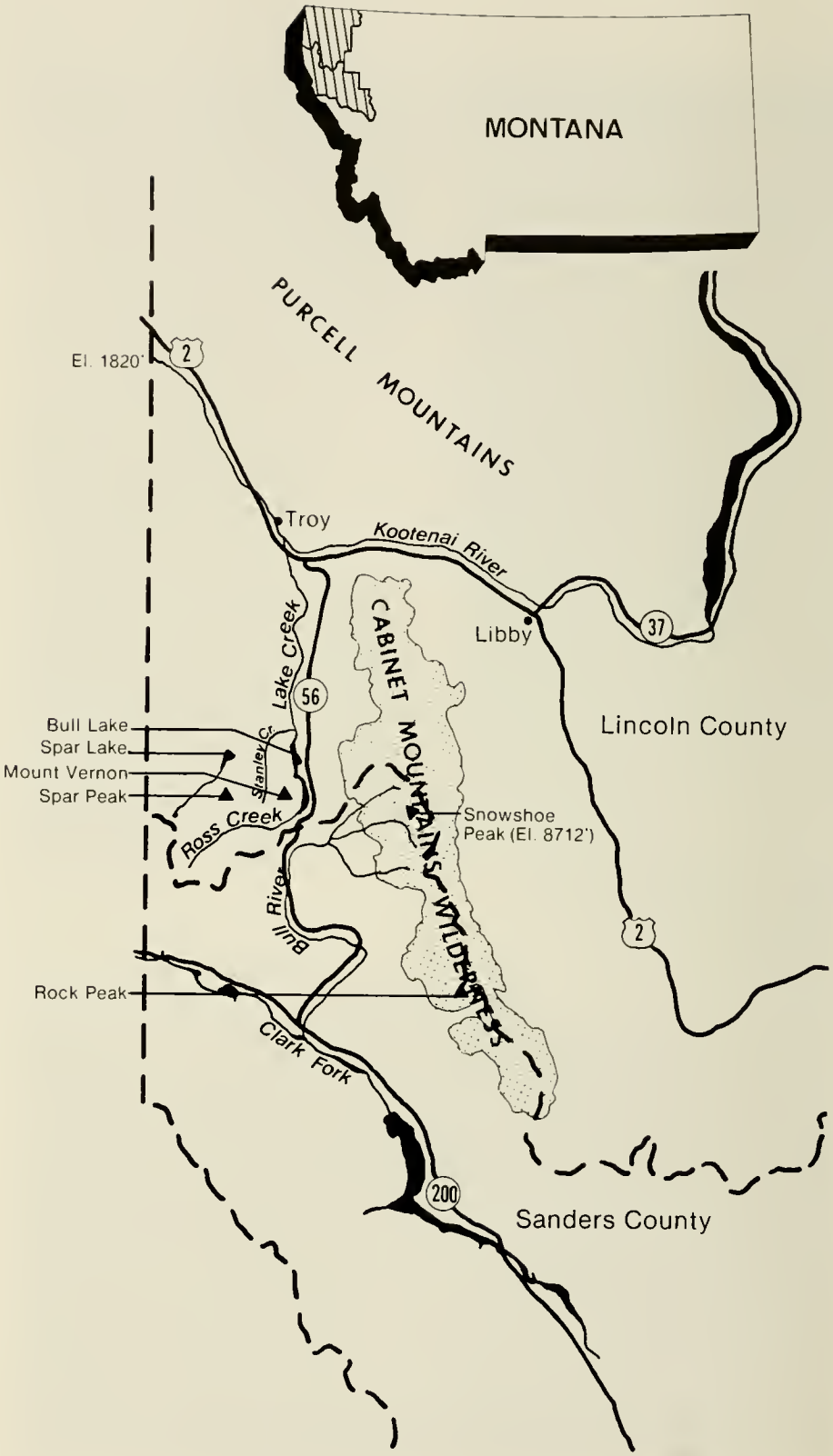
In 1973, ASARCO Inc. entered into an agreement with Bear Creek Mining Company to develop the Mount Vernon area. (ASARCO is a New York- New Jersey-based mineral refining and development corporation that also has operations in Peru, Mexico, Canada, Australia and Nicaragua.) ASARCO initiated engineering feasibility studies and a one-year baseline environmental review in 1973. In 1976, the company indicated to officials of the state of Montana and the Kootenai National Forest that it intended to apply for the necessary construction and operating permits. The Montana Department of State Lands, responsible for granting such permits under mandates of the Montana Hard Rock Mining Law and the Montana Environmental Policy Act, decided it needed additional

information about the project before issuing the permits.

The magnitude and duration of the Mount Vernon development (designated the Troy Project) prompted the Department of State Lands and the Kootenai National Forest to prepare a joint environmental impact statement (EIS). Work on the EIS began in November 1976, and the draft and final EIS documents were issued in August and October 1978. Construction and operating permits were granted to ASARCO in November 1978. Plant site preparation had already begun in early 1978; construction will continue until 1981, after which the project will move into a 16-year production phase.

During the life of the Mount Vernon mine, about 76% of the 64-million-ton ore reserve will be recoverable through underground operation. Approximately 8,500 tons of ore will be mined per day, around-the-clock, for 16 years. To reduce the ore to a concentrate, it will be mechanically crushed to the consistency of granulated sugar, then subjected to a chemical process in which the country rock (called tailing) is separated from the minerals. The tailing, which will be produced at a rate of more than 8,000 tons per day, will be mixed with water from the Stanley Creek drainage and carried in a slurry pipeline down Stanley Creek to the valley seven miles below—a drop of 1,300 feet. The tailing will be distributed in a 400-acre pond to a depth of 100 feet along the east side of Lake Creek, between two tributaries of this major drainage.

ASARCO's plans call for construction of the following within the Stanley Creek drainage: entry, exhaust and ventilation adits into the north face of Mount Vernon; an ore conveyor system from the mine to the surface crusher building; mill and concentrator buildings; a shop and warehouse; offices and shower rooms; a sewage treatment plant; water reservoirs for milling and drinking water; a tailing thickener structure; an 18-inch-diameter slurry tailing pipeline; a return water



pipeline and pump houses; an emergency dump sump; a well field; a 30-foot-wide, 6½-mile haul road from the mine to Highway 56 (formerly 202); maintenance roads; a truck scale; parking lots to accommodate about 200 vehicles; a 50-foot right-of-way for a 115 kilovolt transmission line; electrical substations and fuel storage tanks. The tailing impoundment area will include the tailing dam and impoundment, stripping stock piles, a settling pond, a pump station, a water return pipeline, wells and access and construction roads.

How will all this affect the Mount Vernon area? First one must have a mental picture of Mount Vernon and the country surrounding it. Mount Vernon lies at the head of the Lake Creek Valley, majestically flanking Bull Lake to the west. Although parallel faults border both sides of the valley, the western fault splits near Bull Lake; erosion has exposed vertical rock pinnacles and cliffs, which now compose the jagged eastern face of the mountain. Ross Creek courses along the Mount Vernon-Spar Peak ridge on the south and flows into Bull Lake. Other than the 2½-mile stretch of road that provides access to the Ross Creek Cedars National Scenic Area, the Ross Creek drainage is roadless. It is the last major unroaded drainage in the western Cabinet Mountains.

The Ross Creek drainage constituted a substantial portion of the original Scotchman Peaks Wilderness Study Area, but because of its mineral potential, it is uncertain whether this area will be designated as wilderness. Spar Peak, looming above Spar and Little Spar Lakes, marks the western extension of the Mount Vernon-Spar Peak ridge. Mount Vernon's north face is drained by Stanley Creek, the first tributary to enter Lake Creek below Bull Lake. It is here in Stanley Creek that the Mount Vernon mine is under construction.

Mount Vernon's rugged east face provides one of only two known winter ranges for mountain goats in the western section of the Cabinet Mountains (Ross Point is the other). Some of the goats that winter on Mount Vernon remain there all year, while the rest move westward toward Spar Peak via the Mount Vernon-Spar Peak ridge. Although mountain goats are hardy, strong attachment to traditional use areas leaves them vulnerable in the face of human development.

The Mount Vernon-Spar Peak ridge is also heavily used by elk which move between the upper reaches of the Ross Creek drainage during spring and summer and the lower drainages (including the Lake Creek valley floor) during fall and winter. The Ross Creek drainage constitutes the largest undisturbed block of elk habitat in the western part of the Cabinet Mountains, while on the other side of Mount Vernon, the Stanley Creek drainage is key winter range for both moose and white-tailed deer. The entire Lake Creek area provides some of the finest mountain lion range in Lincoln County. (Lincoln County is among the top counties in the state in number of lions taken each year.)

Northwestern Montana supports a diverse and abundant array of wildlife, but the area's security is diminishing with increasing development. ASARCO is not the only mining company with interests there, and Mount Vernon is not the only site marked for major mining development. Cominco, Phelps-Dodge, Kennecott, even Texaco—which is usually equated with fossil fuel development—are actively seeking minerals in the region. These companies have large blocks of claims and are exploring and developing places like Ross Point, within the Scotchman Peaks Wilderness Study Area; Chicago Peak, within the Cabinet Mountains Wilderness, and the Rock Creek drainage, which was excised from the heart of the Cabinet Mountains Wilderness for mining purposes. Wilderness designation does not necessarily preclude mineral development. Areas already designated as wilderness are open for mineral entry until 1984; areas undergoing wilderness review are generally being excluded from wilderness classification if mineral development potential exists. The claims are numerous and the locations are spread widely over the Cabinet Mountains.

Hard rock mineral exploration and development in the United States are governed by the General Mining Law of 1872 (as distinct from the laws which regulate fossil fuel and uranium exploration and development). Under this law, federal agencies *cannot deny access* to public lands for mineral prospecting, exploration or development, *even when protection of other resources might justify it.* The explorer or developer may build roads and facilities and may use all the surface resources on the mineral claims as long as the use is applied toward mineral development. State government, under the Hard Rock Mining Law, has slightly more control through its authority to require protection of air and water standards and submission of a reclamation plan.

Some mining companies have taken advantage of the outdated General Mining Law of 1872—which has no provisions safeguarding against environmental damage—to promote their interests at the expense of other resource values. Decisions to acknowledge, then mitigate or alleviate these damages are left to the discretion of the companies, which far too often neglect the values of land, wildlife and environmental quality.

To understand the implications of the General Mining Law of 1872 for wildlife, one must be familiar with its basic provisions. Briefly, this law allows any citizen to stake a mineral claim on public land and then to gain legal title to the land by going through the claim-patent process. This involves payment of $2.50 or $5 per acre, depending on the type of mineral deposits present on the claim. Once the patent is processed, this formerly public land becomes private land which the new owner may develop for its mineral reserves or, as has often been the case in the past, sell the land for many times its purchase price without compensation to the public. Thus, the claim-patent system amounts to a public land subsidy to mineral developers. Over two million acres of public land in the United States has become private

The Ross Creek drainage is mountain goat country, as well as the largest undisturbed block of elk habitat in the western Cabinet Mountains. (photo: Lance Schelvan)

land under this system.

This law was established more than 100 years ago to promote mineral exploration by citizens who, in those days, did not have the technology to affect hundreds and thousands of acres in a single development. Today such transactions usually mean lost wildlife habitat and secondary impacts from land development, since there are no provisions to ensure reclamation of areas subjected to hard rock mineral exploration or development. Furthermore, effects of the claim-patent process are not confined to the transfer of a finite piece of real estate—additional impacts stem from wildlife harassment, poaching, wildlife-vehicle collisions and increased human activity. Under the federal law, once the miner is through with the roads, buildings, tailing piles and dams and mills, he can walk away if he chooses, leaving the facilities to collapse, erode and pollute. Although state law provides limited environmental protection, the President's Council on Environmental Quality points out that ". . . western state agencies charged with enforcing environmental regulations for miners are understaffed and underfunded."

The land-use planning processes of the Forest Service and the Bureau of Land Management do not address mineral development; thus they offer no protection to wildlife where mineral exploration or development are concerned. Why? Because according to the 1872 law, mineral development is the highest and best use of public land and thus takes precedence over other land uses. It would seem that the decision to mine should be no different than the decision to graze or cut timber, but that is not the case.

Even on private land, wildlife has no guarantee of protection. Surface and mineral rights are often separated, and the General Mining Law of 1872 allows the mineral right holder to develop his holdings regardless of the wishes of the surface right owner.

What's in store for the wildlife of the Cabinet Mountains? Surely the mineral developments will not result in massive land damage and environmental degradation . . . or will they? Surely the mining companies will be sensitive to the needs of wildlife where mineral developments are planned . . . or will they? Unfortunately, the forecast so far has not been bright. When asked by the Montana Department of Fish, Wildlife and Parks to participate in an effort to ensure and promote the continued existence of mountain goats in the Cabinet Mountains, ASARCO responded it could see "no justification" for such a program. In fact, ASARCO refuted findings of the environmental impact statement on wildlife of the Mount Vernon area when the company stated ". . . [the data] do not indicate wildlife will be adversely affected."

As far as the Mount Vernon mine is concerned, there will be *no* provisions for the moose or white-tailed deer that winter in Stanley Creek, or for the mountain lion travel route that will be bisected by the utility corridor and haul road, or for the extremely important mountain goat winter range on Mount Vernon that will be cut off from the rest of the western Cabinets by the road over the top of the mountain, or for the osprey population of the valley that will suffer from subdivisions and spin-off developments (more than 1,000 people will be directly dependent on the mine). The list of anticipated conflicts goes on and on.

Are mineral development companies the personification of environmental evils and ills? We hope not. But it is unrealistic to expect them to act on behalf of wildlife without some incentive, either legal or economic. It is necessary for the public to make its feelings known so mining companies will feel compelled to assume responsibility for their actions.

We have come a long way from the days of the prairie bison and their demise . . . or have we? Now that the levels of supply and demand have made northwestern Montana's natural resources profitable to procure, what was once prime wildlife habitat may become a mountainous wildlife desert. Time has a way of reversing trends—and security is a relative concept. ■

Readers Respond

F&G Becomes DFWP

• The 46th Montana Legislature enacted a law changing the name of the Montana Department of Fish and Game to the Montana Department of Fish, Wildlife and Parks. This law, which became effective July 1, does a better job of describing the department's mission in two important ways.

First, the state park system has been administered by the department since 1965, and a change reflecting this added responsibility was long overdue.

Second, the 1973 legislature gave explicit responsibility to the department for nongame animals and endangered species. Thus, for the past six years, the department has concerned itself with all wildlife, not just game animals. So, in this and future issues, we will refer to our department as the Montana Department of Fish, Wildlife and Parks (DFWP).

While we are happy with the new name, it requires that we say goodbye to an old friend—"Dear F&G," the former title for this page. "Dear DFWP" didn't sound quite right, so we finally settled on the title you see above. In any event, we trust that you will continue to send us your comments, ideas, cheers and jeers.—Ed.

Wolf or Husky?

I just had to write and express my outrage concerning the female wolf found slaughtered (see "Was a Wolf Killed in Valley County?" in the Jan./Feb. 1979 "The Catchall"). If it has been proved beyond doubt to be a wolf, I certainly hope every effort will be made to secure information and prosecute the people who take federal and state wildlife laws with a grain of salt. I hope that this effort will be made so that all endangered species, not just the wolf, can be given a chance to survive in order that my generation, as well as others to follow, may enjoy their beauty and grace.

It also makes me sick to think that there are people who will shoot at anything without knowing its positive identity. Being the owner of four Siberian huskies who fit the description of that wolf—". . . very large teeth in relation to skull size; a large, broad skull, and large feet in relation to the animal's size"—and given the fact that our male is charcoal grey and black with white flecks and has a huge chest and narrow hips, the wolf described and my male husky appear to be twins. To think that we have to fear that someone might shoot him if we were camping or hiking is simply more than I can believe. I guess we will have to count Montana out.

We are interested in knowing any more facts and the outcome of "Was a Wolf Killed in Valley County?" so please keep us informed.—*Harry and Deborah Cox; Sharpsburg, Md.*

• *See the "Update" on the wolf killing elsewhere in this issue.*—Ed.

Grizzlies in Philadelphia?

To Marion E. Neill whose letter appeared in your Jan./Feb. 1979 issue: Bucks County can have all the coyotes in Carbon County as far as I'm concerned. I know a lot of ranchers in the area who will go along with this. And why not a pair of grizzlies? I'm sure everyone would love some bears trying to find their place in Philadelphia suburbs.

As far as the magazine's controversial coverage goes, hurrah for *Montana Outdoors*. Now more than ever, we need a watchdog to protect our state from environmental degradation. So keep it up.

To Herbert DeVries whose letter appeared in the same issue: I'd just like to say that *MO* is published by the Department of Fish, Wildlife and Parks, not the Department of Birdwatchers and Nature Walkers. If we had no fish, wildlife or parks, we'd have no magazine.

Now to Fish, Wildlife and Parks: How about a primitive weapons season, i.e., a black powder muzzle-loaders' season? You could give us the week between the archery and open firearms seasons or move either season ahead or back and give us two weeks. Either way, I think it could reduce the number of hunters afield during rifle season. It could be conducted the same as the archery season, with the same regulations and a special stamp.—*Dick A. Jacobs; Red Lodge, Mont.*

Motel Tax for Parks?

I read with great interest the Special Parks Issue of *Montana Outdoors*. The Parks Division should be given some priorities. In order to pay for any extension of its budget, I would suggest levying a motel tax. This tax could be used exclusively for the upkeep and acquisition of park lands, just as the gasoline tax is used for the maintenance and construction of highways.—*Poul Houlberg; Kalispell, Mont.*

Health Threat

I grew up in Montana and am coming back to live there soon. Keep the nuclear power plants out and start decreasing the nuclear weapons. They are a threat to our health!

Keep up the good work on *Montana Outdoors*.—*Tom Winters, M.D.; Worcester, Mass.*

Keeping His Distance

I deeply appreciated your 1979 calendar. I love *all* kinds of animals and support wholeheartedly all efforts to protect them, *even* the skunk. Hope he keeps his distance!—*Estelle Carpenter; Hamilton, Mont.*

Powder River Applauded

As a former resident of southeastern Montana, I must applaud the article on the Powder River (*Montana Outdoors*, Jan./Feb. 1979) by department biologist Bruce Rehwinkel. It is about time the importance of this Yellowstone tributary was discussed. The Powder is an important spawning ground for sauger, catfish and sturgeon and also provides vast amounts of wilderness along its banks for deer, antelope, waterfowl and furbearers. Anyone familiar with the history of the American Plains Indian will recognize the Powder River as playing a major role in their history.

It would be criminal to lose a valuable resource such as the Powder because all of the department's money and manpower were directed solely toward blue ribbon streams in western Montana. Many fishermen and hunters have spent many satisfying hours along the banks of the Powder. I believe an equal amount of time and effort should be directed toward this historical river in southeastern Montana; only through continued work can we hope to save an important part of Montana.—*Philip Doherty; Ketchikan, Alaska*

recycled paper

Confessions of a Fledgling Fly-Fisherman

by James Williams
illustration by Vern Craig

Dawn. The stillness of the early morning is fractured by the sound of fish breaking water in search of their morning meal. On this fine, clear Montana morning, I am about to join the ranks of the purists, the great fraternity of true sport fishermen, the fly-fishermen.

I assemble the rod, admiring its balance and careful construction which make it feel like an extension of my arm. I thread the fly line through the ferrules, reach into my pocket and remove a tapered leader and a copy of the booklet, "Knots for the Fly-Fisherman." After carefully studying the instructions, I attempt to join line and leader with the famous sucker stick knot. This knot is more commonly known as the nail knot, but I rarely carry nails while fishing. I do, however, have three children and my car seldom suffers from a lack of sucker sticks.

After 20 minutes, my line and leader remain separate entities, the reward for my efforts being amputation of 2½ yards of my fly line. I finally succeed in tying the perfect sucker stick knot—only to discover I have tied the wrong end of the tapered leader to the fly line. The morning sun is rising rapidly now, so I am forced to use the around-the-finger loop knot in order to conserve time.

The remaining obstacle in my quest for a morning's fishing is selection of the proper fly. I study the water's surface for a moment, then open my fly book and extricate a #16 bivisible blue dun. I hold the fly in my palm, awed by the fact I am able to purchase such an artistic piece for only 75 cents. At this moment, Mother Nature sees fit to deliver a sudden gust of wind which renders my bivisible invisible. A hasty search of the nearby weeds proves fruitless, but I do not panic. As a precaution, I carry two of each fly pattern in my fly book.

Again referring to "Knots for the Fly-Fisherman," I decide to secure fly to leader via the turtle knot. This knot was named for the speed with which the novice is able to tie it. After completing this project, I glance at my watch. An hour has passed since my arrival and I have yet to wet a line.

The moment of truth has finally come. Making sure I have my net, basket and other paraphernalia, I wade cautiously into the stream. The trout are still rising, although not with the fervor of an hour ago. A quarter of the way across the stream I stop, anchor my feet between two rocks and prepare for the magical moment in any fisherman's life: the first cast with a fly rod.

Holding the rod in the 11 o'clock position, I strip 10 yards of line from my reel. With a silent prayer and bated breath I push the rod forward and, at the crucial moment, snap the rod to the one o'clock position. Spellbound, I watch the top half of my rod sail effortlessly into the middle of the stream. Fortunately, my around-the-finger loop knot makes quite a cluster in the line and I am able to retrieve the rod tip without much difficulty.

After reassembling the rod, I lift it skyward. With grace that belies my inexperience, I begin to work the rod back and forth in a maneuver the textbooks refer to as "falsecasting." My arms work furiously as I strip line from reel and endeavor to keep the rod moving. On every other backcast I am forced to bend at the waist in order to avoid being hit in the face by the erratic flight of my fly. To an untrained observer, it may appear I am fighting off an angry swarm of hornets, but I know in my heart I am part of a classic confrontation: Man Against Fish. Goose pimples course through my body from the top of my head to the tip of my toes.

The goose pimples, I soon discover, were actually caused by a combination of factors. My backcasts had been rising progressively higher, causing the fly to journey outward at a dangerously low level during the forecast—so low, in fact, the barb of the hook pierced my scalp at the crown of my head. In

keeping with Newton's Law ("A body in motion tends to stay in motion . . ."), a two- by four-inch patch of hair was neatly excised from the top of my head. Luckily, the tonsorial operation was rapid and the pain inflicted short-lived. I retreat from the stream, anxious to get my hat from the car and protect my newly acquired bald spot from sunburn.

On my return to the stream bank, I notice a spot several yards downstream ideal for the fly-fishing enthusiast. A series of rapids feeds a deep pool protected by a growth of willows and cottonwoods. As I eye the spot, the fish, their voices camouflaged by the roar of the rapids, seem to beckon with their calls, "We're here, we're here." I gather my gear and head downstream.

My first cast produces a nice brown about 24 inches long. I do not, however, consider cottonwood limbs fair game and immediately climb the tree to liberate my fly from the snare of the deadly deciduous. I cast again, working every spin of water in the rapids, every hidden undercurrent in the pool. As I fish, I rejoice in the glory of the golden morning, in the babbling of the cool, fresh water as it scrambles over the rocks in its race to the sea.

My euphoria is interrupted by a long, spine tingling scream, followed instantly by the splash of some large object entering the water. I was directly responsible for both sounds.

Once again I had allowed the fly to get too low. This time the hook penetrated my left ear lobe. Not realizing what had happened and convinced a bee was stinging me, I had screamed, then taken sanctuary in the safety of the stream bottom.

Regaining my composure, I stand and gingerly remove the hook still imbedded in my ear. Dropping the fly in the water, I cradle the rod in my arm as I search for a handkerchief to press against my nose which is now bleeding profusely after its brush with the stream bottom. My hat has been carried away by the current and is probably bound for the Gulf of Mexico.

Suddenly, the tip of the rod seems to bend almost in half.

A fish! A fish has taken my fly! The rod and line come alive as the fish battles the cold steel which holds it captive. The fish comes out of the water, wriggling, struggling to get free, but to no avail. The hook has been set.

Smiling, I bend over and scoop the fish into my net. A rainbow, it must be at least 12 inches long. A feeling of self-satisfaction creeps over me as I join the brotherhood of successful fly-fishermen.

Not wishing to press my luck, I decide to stop fishing for the day. As I walk back to the car, two men, both carrying bait casting outfits, approach the stream. I wipe the blood from my face, hold my fly rod high and stride past them with an air of supremacy. ■

Wildlife Shorts

White pelicans in Montana migrate south and spend the winter along the Gulf Coast of Texas. They share this wintering area with brown pelicans which live there year-round.

* * * * *

The North American opossum is considered a delicacy in many southern states. It does not live in Montana, probably because of cold weather.

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The wingspread of some fossil insects exceeded 27 inches. The modern maximum seems to be the 10-inch wingspread of the Atlas moth.

* * * * *

Baby birds may eat more than their own weight in food per day, while adults of many small bird species need one-fourth to one-half of their weight in food daily.

* * * * *

Tests have shown the slowest animal in the world is the giant tortoise. Even when it is hungry and enticed by its favorite food, it won't go faster than five yards in a minute (.17 miles per hour). Over longer distances, it moves even more slowly.

* * * * *

A skunk discharges only about a twentieth of a teaspoonful of fluid when it utilizes its well-known, smelly defense mechanism. This fluid is under pressure and it is released in a very fine spray that can carry up to 20 feet.

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When monkeys "comb" through each other's fur and pop tidbits into their mouths, they are not catching fleas as many people believe. Instead, they are searching for exuded particles of salt or dead skin in their own or a fellow monkey's fur.

* * * * *

Whatever the true cause of hibernation in mammals, obesity is a necessity for this deathlike torpor. All true hibernators become excessively fat with fall's approach. This fat will be used to supply energy to carry on bodily functions during the long winter months.

* * * * *

American deer have interdigital glands on all feet. These glands are simple saclike structures which lie between the two main digits or "toes." The glands scent the tracks of individual deer, allowing members of a herd to find one another or permitting a doe to easily retrace her steps and find a lost fawn.—*Vince Yannone, assistant chief, Conservation Education Bureau*

Editorial

New Hope for Reasonable Solutions

One of the most significant and, at times, most controversial pieces of wildlife legislation passed in recent years is the Endangered Species Act of 1973.

Initially heralded as a triumph for conservationists, it soon became apparent the act was less than perfect. Early in its life, the act was severely criticized by many sources because it appeared to concentrate too much power in the hands of the Fish and Wildlife Service (FWS).

Much of the initial controversy surrounded Section 7, which provided for "critical habitat" designations. Basically, Section 7 stated that no action could be undertaken by any federal agency, or any federally funded program, that would be detrimental to habitats of listed species which the Secretary of the Interior had determined to be critical. In addition, it became the responsibility of all federal agencies and programs to decide which actions would be permitted within critical habitats.

The problems we have seen are largely the result of extensive critical habitat proposals which would drastically alter existing land uses or land-use plans. In some cases, concern was based only on fear of a critical habitat determination. The snail darter case is an example of the magnitude of influence a critical habitat designation can have. The snail darter (a small fish) prevented Tellico Dam on the Little Tennessee River from becoming operational, even though the dam had been authorized by Congress and under construction for 10 years before the snail darter critical habitat determination.

In another arena, Section 6 of the act called on states to enter into cooperative agreements with the FWS to conserve endangered and threatened species. To enter such an agreement, however, a state had to demonstrate several criteria, including authority to conserve *all* listed species. States that did not qualify were prevented from obtaining federal funds for endangered species management simply because they did not have authority to conserve all listed species. Thus, Section 6 of the act actually had a negative effect on endangered species activities in many states.

Another problem encountered with the act was the temptation for preservationist groups to use it to stop legal harvest of some species by trying to get them listed, even though their actual jeopardy might be in question.

Because of the many problems encountered in administration of the act, and the time lag in entering cooperative agreements with states, it became apparent that amendments to the act were in order. The 95th Congress (1977-79) tackled this problem and wrote the amendments necessary to streamline endangered species conservation. This action generated substantial controversy and reauthorization of the act was delayed for 41 days past the previously established expiration date. With a note of caution as to how the amended act would function, Congress reauthorized the act for only 18 months.

Recent amendments to the Endangered Species Act offer new hope that reasonable solutions can be provided to some of the sticky problems of the past. The amendments call for consultation with the FWS on any federal action which may affect a listed species. If conflicts cannot be resolved through consultation, an exemption may be granted. Exemptions may only be granted through a two-tiered process involving a Review Board and a Cabinet-level Endangered Species Committee.

One of the most significant changes in the act is an amendment requiring evaluation of economic impact in critical habitat determinations. If the economic impact for an area outweighs the benefits to the listed species, that area may be excluded from critical habitat determination. This provision will undoubtedly alleviate one of the sharpest criticisms of the Endangered Species Act.

New standards were drawn up to assist states in entering into cooperative agreements. A state no longer has to demonstrate management authority over all listed species. Instead, a state may enter into a cooperative agreement and receive federal funding for those species judged most in need of conservation efforts. Even though most states will probably seek cooperative agreements in the near future, many endangered species programs will be limited. Federal funds are available only on a 2-to-1 matching basis, so the funding level depends on a state's ability to provide its share of matching funds. For example, in Montana the maximum amount of funds which could be matched is only about one-half the amount suggested by the various Endangered Species Recovery Plans. (Recovery plans have been approved for the black-footed ferret and peregrine falcon.) Endangered species activities will have to be carefully prioritized when (and if) federal funds become available.

Additional provisions include simultaneous listing of a species and its critical habitat, periodic review of listed species, a public notification process for species or habitat listing, a requirement for public hearings on critical habitat proposals, a two-year limit on listing proposals and a determination of adverse activities within proposed critical habitats.

Many other small changes were made in the act, all of which make it more flexible and responsive to society's needs. Yet, for all the changes, the Endangered Species Act still remains a powerful benefactor to those wildlife species in danger of extinction.

Even though some negative aspects of this legislation remain, it must be remembered that only man—if he so desires—can conserve or perpetuate endangered species. As President Carter said when he signed the legislation, "Destruction of the life of an endangered or threatened species should never be undertaken lightly, no matter how insignificant the species may appear today." Recovery of endangered species is perhaps one of the most difficult challenges facing the wildlife profession. Success will require determination, hard work, understanding of political procedures and commitment. A sympathetic attitude won't be good enough.—*Dennis Flath, nongame biologist*

photo: Mike Sample

The Madison River: What Does the Future Hold?

by Dick Vincent

The Madison River, one of the three forks of the Missouri River, was named after President Thomas Jefferson's Secretary of State James Madison. Meriwether Lewis described the river as a "rapid" and "noble" stream, "formed of smooth pebble and gravel and [its] waters perfectly transparent." It has long been regarded by anglers across the nation as one of the state's finest wild trout rivers. What does the future hold?

To answer this question, we must learn something about the river. It begins in Yellowstone National Park with the union of the Gibbon and Firehole rivers. The Madison then flows approximately 140 miles north, joining the Jefferson and Gallatin to form the Missouri.

Two man-made impoundments and one natural lake interrupt the original free-flowing Madison. The two man-made impoundments, Hebgen and Ennis reservoirs, were built by the Montana Power Company (MPC) in the early 1900s. Hebgen, the larger reservoir, lies about 1½ miles north of the national park boundary and is a major water storage facility for downstream electrical power generation dams. On the other hand, Ennis Reservoir is an electrical power generation site dependent on water stored in Hebgen Reservoir. Ennis Dam is situated approximately 57 miles downstream from Hebgen Dam. In August 1959, a major earthquake in the Hebgen area caused a huge earth slide across the Madison River three or four miles below Hebgen Dam, creating Quake Lake.

General geography and the available sport fishery divide the Madison River into two major sections—one section upstream from Ennis Reservoir and the other downstream from Ennis Reservoir to the mouth of the Madison. A wide, shallow channel with numerous riffle areas and large boulders and water seldom deeper than five feet characterize the "upper" river. In the lower 10-12 miles of this section (Varney Bridge to Ennis Reservoir), the river becomes braided with many smaller side channels. Here the river deepens with many brushy, undercut banks. The channel bottom is covered with cobble- and boulder-sized rock and harbors an abundance of aquatic insects. This upper river, the most heavily fished section of the Madison, is considered by many anglers ideal fly-fishing water.

The "lower" river begins below Ennis Dam in a narrow gorge, Bear Trap Canyon, where the water is fast with many pools separated by fast runs and riffles. After about nine miles, the river opens into the Madison Valley, where it widens and slows down. At the upper end of the valley, the river is wide with numerous large weed beds and few runs deeper than five feet. As the river proceeds into its last 16-18 miles, the channel again becomes quite braided with numerous small side channels.

The Madison River has long enjoyed a national—if not international—reputation. Its fame began to surface in the 1930s and '40s and by the early '50s, over 10,000 angler-days of use were shown between what is now Quake Lake and Ennis Reservoir—51 miles of river. About 20% of the use was by nonresident anglers. They carried back stories of high

productivity, natural scenic beauty, clear unpolluted water and easy access. So the Madison's national reputation was assured. Plus, anglers consistently caught wild brown and rainbow trout weighing from one to four pounds. The river's unique origin in the chemical-rich thermal waters of Yellowstone National Park probably accounts for its high production of aquatic insects, which results in numerous large wild trout.

How has the Madison River fared during the '60s and '70s? Increased fishing pressure is perhaps the most dramatic of all changes over the last two or three decades on the Madison. From 1952-67, angling pressure on the section between what is now Quake Lake and Ennis Reservoir increased approximately 230% (from about 11,000 angler-days to over 36,000). By 1975, angling pressure had jumped to over 48,000 angler-days—or 940 angler-days per mile for the 51 miles within this stretch of river. This means angling pressure increased 440% in the last 23 years and there is no reason to believe fishing pressure will go anywhere except up in future years. This increase has had two major effects: (1) an ever-increasing demand on a resource with finite limits and (2) overcrowding of anglers on certain sections of the river.

Some areas of the river have experienced more angling pressure than others due to ease of access, such as the area between Quake Lake and McAtee Bridge. In recent years, anglers complained that fewer large trout were being caught, especially compared to catches in the early 1950s. In 1975, the Department of Fish, Wildlife and Parks initiated a long-term creel census/fish population study within this section. A 4.5-mile study section betwen Squaw and Wolf creeks (Snoball) was selected to determine the effect of intense angling pressure on the existing wild trout populations. Initial findings from the fish population work showed few wild trout in the study section over 14 inches long and trout in the two- to four-pound range exceedingly rare. The 1975-76 checks of fishermen's creels showed few trout exceeded 12 or 13 inches, with the average size about 11 inches.

Even though the average size of the fish caught was small, the success rate was quite good. For example, creel information from other streams in Montana indicates a catch rate (average number of fish caught per hour) of 0.5-1.0 trout per hour, while the catch rate for the Snoball area was estimated at 2.5 trout per hour in 1975 and 1.3 per hour in 1976.

The amount of angler use on various sections of the Madison River changes with angling regulations and ease of access. Certain segments of the river border public land which guarantees good access (for example, the Quake Lake to McAtee Bridge and Bear Trap Canyon reach), while many other segments have limited access, mainly near roads and bridges. Many anglers began using boats to fish some of the sections with difficult access. Float fishing regulations have varied from year to year, ranging from allowing float fishing on the entire river to restricting it to certain areas.

Areas open to float fishing generally received more use than those restricted to bank fishing only. The heavy pressure caused by float fishermen has created two main areas of concern: (1) heavy boat use and damage to the wild trout fishery and (2) heavy competition between float fishermen and shore anglers for the same piece of water. Information from the 1975 and '76 studies in the Snoball area verified that boating changed angler use patterns and increased angling pressure. During 1975, when only bank fishing was allowed, 1,300 anglers used the area, compared with 3,200 anglers who used the area in 1976 when floating was allowed. Over 80% of the 1976 pressure came from boat fishermen.

Not only will demand increase, but the fishery resource will probably shrink because of continued destruction of fish habitat caused by appropriations of water for other uses, bank habitat destruction and degradation of water quality. These losses will result in more stringent regulations, such as: (1) reduced limits, (2) size limits where only a specific number (if any) could be kept over certain sizes, (3) species management where certain more vulnerable trout species would have more severe creel or size limits, (4) control of where and when float fishing could occur, (5) possible control of angler numbers, (6) restrictions on certain types of angling gear and (7) possible catch-and-release only regulations where no trout may be kept.

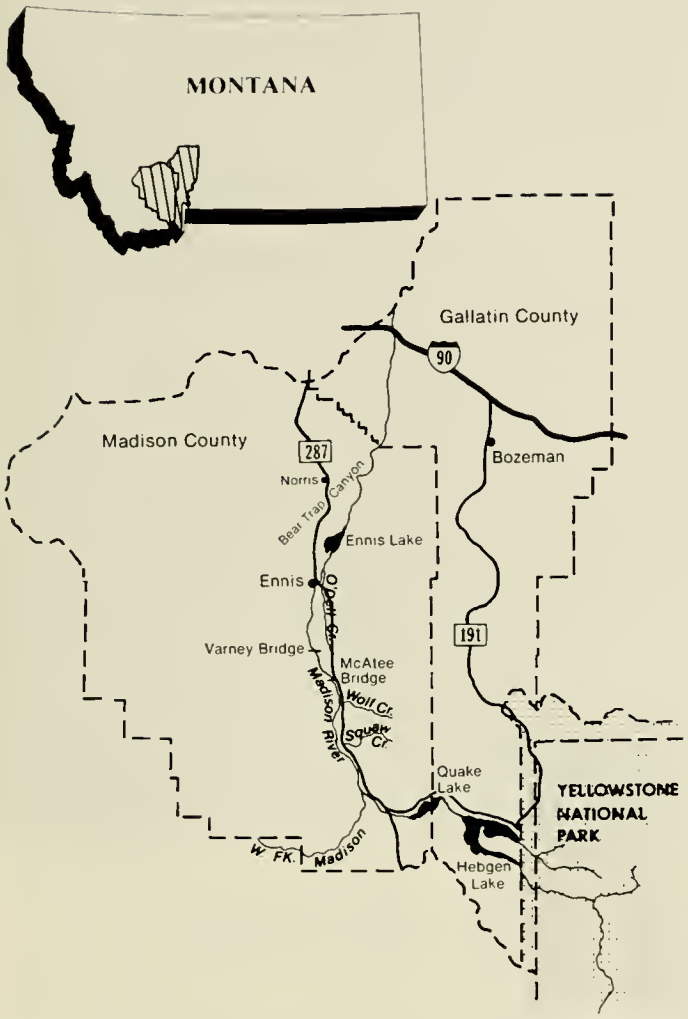
To ensure maximum trout populations in all sections of the Madison River, present water flows must be maintained year round. The primary water use on the Madison currently is electrical power production, with some smaller demands by agriculture. MPC uses water stored in Hebgen Reservoir to ensure adequate water flows through Ennis powerhouse and other downstream generation sites to produce electrical power. In the past, water storage patterns at Hebgen Reservoir varied enough from year to year to cause periodic dewatering of the Madison River. Before 1968, the storage pattern varied according to snow pack. During the drier winters, water storage began as early as February and continued into mid-May when snow run-off generally began. In some sections, the river was dewatered as much as 35% before the spring run-off could provide the necessary water.

Fisheries studies in the late 1960s on the Madison River showed that during years of heavy dewatering, wild trout numbers decreased up to 50%. Losses occurred in all sizes of trout. By using updated snow survey information from the Soil Conservation Service, which can project spring run-off volumes, MPC now is able to avoid taking water out of the Madison during early spring flows and still can keep Hebgen Reservoir full. Because of this excellent cooperation by MPC, water flows since 1968 in the Madison River have provided quality habitat for a wild trout population.

"The future of the Madison River? It can be good, or it may not be so bright. It depends on how much concern exists to preserve sufficient flows in the river to maintain a quality trout fishery."

However, future demands for water from the Madison River are unclear, although one can assume they will increase. Any additional consumption of water will negatively impact wild trout. To ensure maintenance of the present quality wild trout fishing, careful water use planning must precede any new water use requests.

From the mid-1950s through 1973, the upper Madison River was stocked annually with catchable-sized rainbow trout to supplement the wild trout fishery. At that time, fisheries biologists believed this would increase the number of trout available and satisfy the accelerating number of anglers using the river. Even though the stocking program was expanded greatly by the mid-1960s, anglers constantly complained that fishing was becoming poorer each year, especially for larger trout. Fisheries studies conducted from 1967-72 on the Madison River and O'Dell Creek, a tributary of the river, showed that when catchable-sized rainbow trout were stocked in a river with a wild trout population, the numbers of wild brown and



rainbow trout decreased. The decreases were most significant in larger fish—those between 12 and 18 inches long and the ones most prized by anglers. After three years without stocking on a five-mile section below Varney Bridge, the number of larger wild brown trout increased 250% and the larger rainbow trout increased over 400%. Significant increases were even shown for trout between two and four pounds.

Because of this information, all stocking was discontinued in 1973 and future stocking of catchable-sized trout in the Madison River seems unlikely since the angler receives no real benefit. The Madison River management goal—to provide a quality wild trout fishery and to maintain or increase the number of 14- to 18-inch fish available to the angler—can be more easily met by not stocking hatchery fish.

Presently, a serious environmental problem threatens the trout and whitefish fishery in the Madison River below Ennis Dam. Because Ennis Reservoir is wide and shallow (14,680 surface acres with an average depth of nine feet), it acts as a huge solar heat collector warming the reservoir water and then passing the heated water on to the lower Madison. This warming effect is especially noticeable during June, July and August when the lower river averages 7-9° F warmer than the river above the reservoir. During extremely hot weather in July and August, water temperatures occasionally reach the low 80s (the warmest recorded was 82° F). Water temperatures above the reservoir seldom exceed 72° F during the hot spells. Normally in southwestern Montana, the cool nights in the high valleys lower the afternoon water temperatures to the low 50s. But because the reservoir stores this warm water and passes it on to the lower Madison, nighttime water temperatures in July and August seldom are lower than 65° F. In the Norris area, night water temperatures sometimes fail to go below 70° F.

What does this mean to the angler and the wild trout and whitefish populations? In this area, warmer water usually means more productive trout populations and much faster trout growth. But carried to an extreme, warm water slows trout growth, resulting in fewer large trout. Also, warm-water fish such as carp, yellow perch and chubs thrive and sometimes replace the trout and whitefish. Ideal water temperatures for trout and their food organisms (aquatic insects and sculpins) is between 45-65° F, with the optimum temperature 59° F. The temperature problem in the lower Madison River has been studied since 1972; during this time, the number of large brown and rainbow trout has declined.

It takes two or three years longer for a trout to reach two pounds in the lower river than it does in the Varney area above the reservoir. Average July-August water temperature in the Varney area is about 58-59° F, but in the lower river near Norris it ranges from 66-69° F.

Information from water temperature recorders above and below Ennis Reservoir indicates a significant rise in the water temperatures immediately below Ennis Dam. Given the same air temperature, Ennis Reservoir warms up the lower Madison River 1-2° F more now than it did 10 years ago. This is probably due to additional sediments added to the reservoir's bottom from upstream sources such as the Quake Lake slide area, the west fork of the Madison River and other tributaries, which make the reservoir more shallow and even more sensitive to solar heat. If the reservoir temperature rises or an unusually hot summer occurs, the present wild trout population could suffer damage. Even if neither of these happens, this population of 14- to 18-inch trout seems destined to reach far less than its potential.

Are there any solutions? A recent Madison River thermal steering committee, sponsored by the 208 Blue Ribbons of the Big Sky Areawide Planning Organization, came up with the following possible solutions: (1) remove the dam, (2) raise the height of the dam to deepen the reservoir, (3) lower the dam to reduce surface area able to absorb solar heat, (4) dredge to deepen the reservoir or (5) dike the reservoir to either move the water around or through the reservoir quickly.

A further impact in the last 10-15 years has been the significant increase in land development activities adjacent to the upper Madison River, mostly new subdivisions for home sites. It may be the very beauty of the area—which initially attracts people—that becomes its downfall. Certainly such development, if carried out without concern for the whole Madison Valley, could diminish its scenic beauty, decrease water quality and increase fishing pressure.

The future of the Madison River? It can be good, or it may not be so bright. It depends on how much concern exists to preserve sufficient flows in the river to maintain a quality trout fishery. It depends on whether we take the time and money necessary to solve the temperature problem in the lower river. Finally, it depends on wise planning for any future development along the Madison River to ensure its lasting scenic beauty. In short, the future of the Madison River is in the hands of those who use and enjoy it. ■

Cavity Nesters:

Part of Montana's Bird Heritage

by B. Riley McClelland

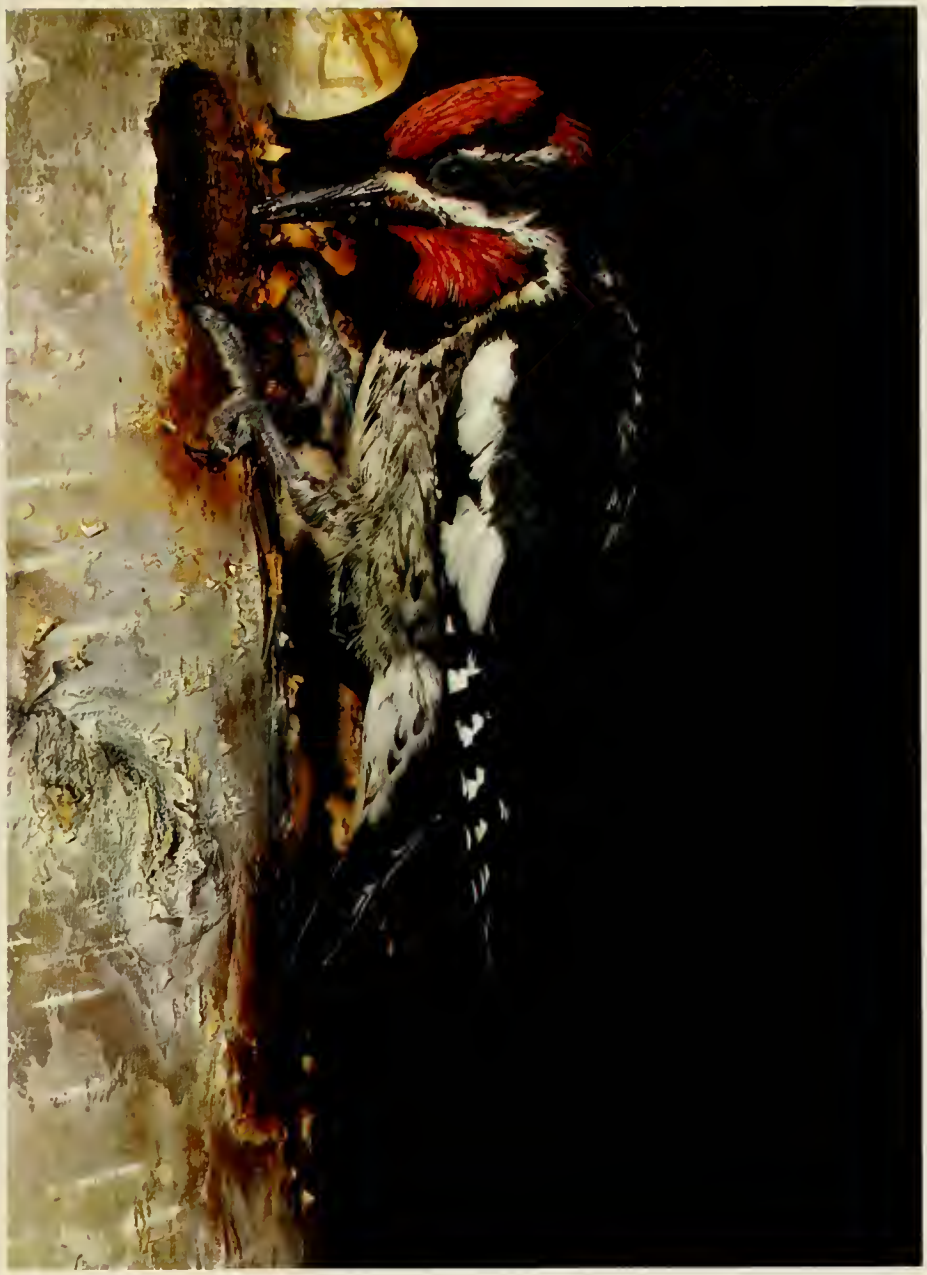
WHILE COLD SPRING rains dampen the nests of many birds, woodpeckers and other cavity-nesting birds are laying eggs, incubating and feeding their young in the relative warmth and safety of tree cavities. In Montana forests, about one-fourth of the bird species are cavity nesters. This group includes some of the state's most interesting and beautiful birds—chickadees, nuthatches, bluebirds, tree swallows, house wrens, small owls, American kestrels and a number of ducks, as well as all woodpeckers.

Cavities occur both in snags (standing dead trees) and within the heartwood of live trees. Wood decay is almost always involved in their formation. The decay is caused by fungi (primitive plants that enter a snag or tree in the form of spores and then grow by using materials from the tree's cell walls). This process gradually weakens and softens the wood, making it suitable for excavation by woodpeckers, although sometimes, after many years of decay, a natural cavity will result.

Woodpeckers are well-equipped for excavation. Most species have stout bills and "shock absorber" muscle/bone structure in the skull. Chickadees and nuthatches are also capable of excavating nesting cavities. However, they have thin bills (for capturing insects), which restrict them to making nest holes in very soft wood.

Birds excavate by pecking, chiseling and removing small pieces of wood, gradually working their way from entrance hole to interior nesting chamber. Some nesting cavities are quite large. For example, the pileated woodpecker makes a nest cavity about 18 inches deep and eight inches in diameter. The entrance is roughly triangular and about four inches across at the base. This task is repeated every April and May and takes from four to six weeks.

"Primary" cavity nesters (those which excavate their own cavities) lay their eggs on wood chips remaining in the bottom of the cavity. "Secondary" cavity nesters use natural cavities or, more often, abandoned woodpecker nests and build "secondary" nests within the



The pileated woodpecker (left), a year-round resident of northwestern Montana, requires old-growth forest for nesting habitat. Large snags (lower left), especially those of western larch, ponderosa pine and black cottonwood, play an essential role in the life history of cavity-nesting birds. The mountain chickadee (above) is capable of excavating cavities in well-decayed wood, but it often nests in holes abandoned by sapsuckers. (photos: B. Riley McClelland) Many cavity-nesting species depend on the nesting and feeding "pathways" constructed by the yellow-bellied sapsucker. (right, photo: Dean Biggins)

cavities. Because woodpeckers excavate new nest cavities each spring, those from previous years are available to hole nesters incapable of excavating. Saw-whet, screech and pygmy owls often use abandoned pileated nest holes. Along rivers or lakes where pileated woodpeckers often nest in large black cottonwood snags, abandoned nest holes are available for wood ducks, goldeneyes, hooded mergansers and buffleheads. Small mammals also take advantage of tree cavities; the pine marten and red and flying squirrels find refuge and may raise young in holes abandoned by woodpeckers.

Pileated woodpeckers in search of carpenter ants make feeding excavations deep into decaying trees. These rectangular cavities (without a nesting chamber below the entrance) are often used as night roosts by small birds such as chickadees, nuthatches and brown creepers. Such roosts are especially important during cold winter nights, when exposure could be fatal. Many cavity nesters (including the pileated woodpecker) are year-round residents in Montana.

Many forest birds rely on the pileated woodpecker. Indeed, it is a "pathfinder," a term originally used by biologist Gerhard Kneitz to describe two European woodpeckers that create nesting "paths" for species unable to excavate their own cavities. The most important requirement for nesting habitat for our pathfinder, the pileated woodpecker, is old-growth forest. In Montana's western larch forests, "old growth" means trees more than 20 inches in diameter; such trees are usually more than 200 years old. The trees must be large because the pileated woodpecker is about 17 inches long. In northwestern Montana, my students (from the University of Montana School of Forestry) and I have studied cavity-nesting birds for the past six years. With the help of many people, we have located 54 active pileated woodpecker nest trees; these trees averaged 30 inches in diameter. As well as having large trees and snags, old-growth forests have a much higher incidence of decay than younger forests.

Although pileated woodpeckers occasionally give the impression of being relatively abundant, it is only

because they are large, handsome birds and easily noticed. In Montana, only one pair of pileateds would be expected year-round in 500 acres of old growth. Occasionally they are seen outside of old-growth forests—even in towns—especially when young of the year disperse from the parents' territories. However, no evidence exists to suggest that populations can be sustained unless old-growth nesting habitat is available.

Montana forests are also inhabited by another "pathfinder" species: the yellow-bellied sapsucker. This species, the most abundant woodpecker in many areas, has often been persecuted because of its reputation for killing trees by drilling holes to obtain sap. Yellow-bellied sapsuckers drill through the outer bark of live trees (especially paper birch) to reach the soft inner bark (phloem), through which compounds manufactured in the leaves flow downward in the form of sap. After the holes are drilled and later widened, they become "sapwells" that provide a source of food. If the holes encircle the tree, the tissues that transport sap to the roots are severed and the tree dies. Sapsuckers that drill on favorite lawn or orchard trees can often be discouraged by wrapping the feeding site with burlap. The "damage" caused by this species must be viewed in perspective, because the yellow-bellied sapsucker is truly an important pathfinder in two respects.

First, sapsuckers create feeding "paths" for many species—other birds, small mammals and insects. At sapwells on paper birch trees at the Forest Service's (FS) Coram Experimental Forest in northwestern Montana, we have observed feeding by adult and young sapsuckers, hairy woodpeckers, rufous and calliope hummingbirds, red squirrels, ichneumon flies, admiral butterflies, bald-faced hornets, yellowjackets and numerous other insects. At night, the sap attracts flying squirrels and moths, and bats are in turn attracted to the moths. Sapwells seem especially important to hummingbirds in late summer. When flowers have faded and nectar is no longer available at lower elevations, sapwells sustain many hummingbirds that do not move to the late-blooming flowers at high elevations.

Second, sapsuckers create nesting "paths" the same way as pileated woodpeckers do. Because sapsucker nest holes are much smaller (about 1½ inches in diameter) than those of the pileated, birds such as nuthatches and chickadees occupy them. On forest edges or in open areas, bluebirds and tree swallows use old sapsucker nest holes.

The sapsucker has much less exacting habitat needs than the pileated woodpecker. Sapsuckers in Montana are most common on riparian (streamside) sites, but they also are surprisingly abundant in upland forests, including many old-growth stands. Sapsuckers nest in snags or decaying live trees as small as 10 inches in diameter, even on extensively logged sites. Thus, sapsuckers are less sensitive to timber cutting than pileated woodpeckers.

Old-growth forests are clearly very important to many cavity-nesting birds, but are birds selective in terms of tree species or tree condition? Over the past six years, we have located more than 300 active cavity nests of 20 bird species. Some tree species, such as western larch, ponderosa pine and black cottonwood are clearly preferred because of their decay characteristics and large size. Aspen and paper birch are also very important to smaller hole nesters.

At high elevations, mountain bluebirds and flickers use whitebark pine snags. Trees that tend to be most abundant—Douglas-fir and lodgepole pine at lower elevations—are used least. The decay characteristics that produce the most desirable potential nest sites include decaying heartwood and decay-resistant sapwood or bark (outer shell). This combination results in a nesting cavity surrounded by a relatively sound shell of wood and provides maximum nest site protection. Douglas-fir snags are not preferred because the sapwood decays rapidly along with the heartwood; by the time the snag is five years old, almost all wood is decaying extensively.

Although nest sites are often excavated in live western larch or live aspen with heartwood decay, snags play an essential role in the life history of cavity-nesting birds. Seventy-eight percent of the 54 active pileated woodpecker nests found were in snags (most in larch, ponderosa pine or black cottonwood —none in Douglas-fir). Snags with broken tops are used much more frequently than those with tops intact (a ratio of about 5-to-1). Snags also provide nesting sites for many other birds. For example, the brown creeper, a small year-round resident of Montana forests, builds its hammocklike nest in the space between the sapwood of a snag and a piece of bark peeling away from the sapwood. The brown creeper does not require an excavated hole, but it does need this specialized cavity. When a snag has lost all of its bark, it can no longer provide a nest site for this little bird. The brown creeper must depend on a continuing supply of snags to provide the right stage of bark loss.

Snags are used by birds for many other activities. Olive-sided flycatchers sing from the tops of tall snags, and American kestrels make hunting forays from perches in snags. Woodpeckers feed on the insects inside snags, but also use the snags for drumming—a rapid beating of the bill on dead wood to produce a staccato rhythm. Drumming apparently is used to attract or communicate with a mate, and to announce territories. In effect, a drumming woodpecker is announcing to competitors, "Stay away—this is my territory." Both male and female woodpeckers drum, especially in the spring before and during nesting.

Obviously, snags are important to birds for many reasons. But they are also becoming increasingly important to man. For years, snags were routinely cut in logging operations, even when there was no intention of using them for lumber. This still occurs in areas where they are considered serious safety and fire hazards. Fears are expressed that snags might fall on unsuspecting loggers or recreationists. This does happen rarely, but probably many more people are killed or injured while cutting snags than by snags unpredictably falling. It was long

thought that snags "attracted" lightning strikes, and were therefore responsible for most forest fire starts. However, Alan Taylor, former FS research forester (now with the Fish and Wildlife Service) who has extensively studied lightning's influence on the forest ecosystem, believes the role of snags in fire ignition has been overstated. His research shows that lightning strikes live trees much more often than it strikes snags. Whether a lightning strike is more likely to result in sustained combustion in a snag than in a live tree is unknown. Burning snags shed embers, spreading fire in some cases, and no doubt snags occasionally need to be cut for fire prevention or safety reasons. But wide-range snag removal is not only unnecessary, it also eliminates essential habitat components for many cavity nesters. Wildlife's needs for snags should be carefully considered before they are removed in the name of fire prevention or safety.

Another threat to cavity-nesting birds involves increasing demand for snags as fuel and fiber sources. Firewood cutters currently remove the snags with highest value to wildlife—the large western larch, ponderosa pine and black cottonwood. Large snags, and the birds that use them, have disappeared from many areas accessible by road. If woodcutters were more selective—using down wood or wood in slash piles, snags less than 14 inches in diameter and species less used by birds (lodgepole pine and Douglas-fir)—we could maintain a higher percentage of forested land on which cavity nesters could be supported. The closure of roads after logging would protect snags that are left. The other drain on large snags comes from paper mills, which use them to make paper and fiberboard. Several years ago, Hoerner-Waldorf announced a "5-D" program, emphasizing salvage of dead, dying, defective, diseased and down trees—what the company described as an otherwise "wasted" resource—for use in its pulp mill. Unfortunately, the program focused on just those snags and trees most valuable to cavity nesters.

Perhaps the major challenge to managers concerned with habitat for cavity nesters involves perpetuation of old-growth forest stands. Simply saving existing snags will not be effective over the long run, because snags eventually fall. In large wilderness areas where natural processes such as fire, disease and insect attacks are allowed to function, diverse forests with snags will continue to occur. But in other areas, managers will need to use prescribed fire or cutting strategies that simulate natural processes to produce snags and encourage the tree species and age classes needed by cavity nesters.

The perpetuation of old-growth forest runs counter to the current trend of converting old growth to younger stands which support few cavity-nesting birds. Compromises are needed so that the full spectrum of wildlife—including cavity nesters—will not be sacrificed for maximum timber production on all sites. Some national forest managers are making significant strides toward a broader balance. On the Coram Experimental Forest, a recently planned timber sale included a 40-acre, old-growth corridor to be left uncut within the sale area. The corridor will provide nesting and feeding areas and cover for birds and other animals. In the remaining harvest area, snags and large, decaying larch (and future replacements) will be left. Maximum timber volume will not be realized, but this broader perspective will produce a forest community with greater diversity and less artificiality.

Perpetuating habitats that support cavity nesters may become increasingly significant for forest managers. Cavity nesters are primarily insectivorous. Although insect-eating birds probably do not "control" insect populations singlehandedly or stop insect epidemics, they play important roles. For example, S. B. Beebe of the Yale University School of Forestry summarized the conclusions of "literally hundreds" of research papers: ". . . in many instances, birds act as important components of natural biological regulation of insect population[s] . . . . the most important role of birds is in the prevention of insect epidemics, rather than their suppression."

It has been suggested that nest boxes can substitute for missing snags or decaying trees. Although boxes are useful to some bird species (bluebirds, wood ducks), they are rarely used by woodpeckers, except flickers. (Excavation seems to be part of the woodpeckers' courtship ritual.) In addition to not being used by all species, boxes lack the natural and aesthetic appeal of snags. While boxes may temporarily serve as replacements for nest sites in areas where all snags have been removed, we need to concentrate on retaining and replacing natural snags. Boxes serve only as nest sites, while snags are used for perching, drumming and feeding, as well as nesting.

The most extreme suggestion sometimes heard is that cavity nesters will eventually adapt to the absence of cavities—that they will simply learn to nest on branches, as do robins, or on buildings, as do pigeons. The only woodpecker that seems to be adapting to a lack of cavities is the common flicker. Flicker nest sites have been observed in holes in banks and even on the ground. But this tendency has been evolving in the flicker over thousands of years, long before man extensively modified North America. The other woodpeckers show no such adaptability. There is no reason to believe they will respond to the loss of snags and decaying trees in any way other than disappearance, as did the ivory-billed woodpecker in the southeastern United States and the imperial woodpecker in northern Mexico.

Cavity nesters are part of Montana's bird heritage. They add to the quality and diversity of life because, as Paul Errington once wrote of predators, they are part of "life's wholeness." Montana already has large areas where cutting has removed all old growth and snags. But we still have an opportunity to reorder priorities to achieve true land husbandry so that our actions reflect greater sensitivity to the needs of all wildlife, including cavity nesters. The opportunity must be seized soon, or some of the sights and sounds we associate with Montana forests might be lost forever. ■

Shorebirds of Montana
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